BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 44.] 1947. [No. 7.

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In Hawaii, five human cases of plague (all fatal) were reported in 1944, and a considerable number of infected rodents and fleas were found, all in the Hamakua District, an agricultural area. HAMPTON (p. 554) makes the point that the disease, as seen in Hawaii, is very severe.

DAVIS (p. 1038) describes the recent outbreak of plague in Ngamiland, S. Africa, the biggest so far recorded in S. Africa. An epizootic in gerbils had apparently initiated a secondary epizootic in the semi-domestic multimammate mice, and this coincided with climatic factors which resulted in extensive flooding of the burrows of these mice, with the result that they were driven into closer contact than usual with the villages and kraals, where they obtained grain and other food. Control measures included vaccination, the use of cyanogas for destruction of rodents, the spraying of huts [presumably with DDT] and quarantine. It is noted that plague-infected rodent fleas in the huts were responsible for spread of the disease, and that most of the fleas were without rodent hosts for much of the epidemic.

ROTMAN (p. 34) describes an outbreak of bubonic plague in Dakar, noting that the disease is endemic there, and that rodents along the coast are liable to epizootic plague. KARTMAN (p. 740) refers to the outbreak in Dakar, and raises the question of the flea responsible for spread. Although *X. cheopis* is by far the most common flea found on rodents, it is rarely found in houses; the flea *Synosternus pallidus* is very prevalent on the floors of native huts and is the common house and body flea. Further study of *S. pallidus* as a vector in the Dakar area is indicated.

COLE (p. 331) shows that the proportion of male *X. cheopis* taken on rats varies with atmospheric temperature, and suggests that flea indices should therefore be computed for female fleas only (which are not subject to the same variation). WHEELER and DOUGLAS (p. 35) distinguish between the infection potential, the vector potential, and the transmission potential of fleas, and regard the product of these potentials as an index of vector efficiency. Calculations were made on this basis to compare the vector efficiency of various species; as would be expected, *Diamanus montanus* and *Xenopsylla cheopis* were efficient. For details the original should be consulted.

Pathology: Treatment.

In discussing the results of routine work on plague, carried out during many years at the laboratory at Blukwa in the Belgian Congo, DEVIGNAT *et al.* (p. 330) report that in autopsies of guineapigs inoculated with plague material three types of disease were found: violent septicaemia with enlargement of liver and spleen, a moderate form with enlargement and mottling of liver and spleen, and a form indicating partial resistance, in which liver and spleen have a pseudotuberculous appearance, and there are whitish tubercles in consolidated lungs.

MAGROU and BRISOU (p. 926) describe an outbreak of plague in laboratory guineapigs in which the autopsy appearances were so unusual that plague was not at first suspected. Cultures were negative, and only Gram-negative rounded bodies could be found in spleen smears. The authors suggest that these may be the only forms of *P. pestis* present in smears or lymph glands in the benign forms of plague.

CORNIL *et al.* (p. 216) report on the morbid anatomy and histology of guineapigs and rats inoculated by various routes with *P. pestis*.

BHATNAGAR and SHRIVASTAVA (p. 840) report an experimental study on cellular immunity in plague, in which, after infection of highly resistant Bombay rats, or highly susceptible inbred mice, they have examined the leucocytes of the peripheral blood stained by a supravital technique. Some of the animals were immunized by serum prepared against the envelope substance of the

bacilli (pure envelope serum), some by pure somatic serum, and some by whole antiplague serum; of pure sera, only the envelope type is protective, and this was confirmed by the leucocyte response investigated by the authors. The details of the cellular response to infection, under the conditions of the various experiments, should be sought in the original.

As a result of his experiments on blood culture in plague, GIRARD (p. 439) concludes that in a suitable medium, growth can be initiated if the inoculum contains no more than a single living plague bacillus. If blood culture is negative it is because there are no living organisms, and no flea could become infected by ingestion of that blood. In plague, the blood contains no bactericidal or inhibitory substances which could complicate growth conditions.

MACKAY-DICK (p. 128) writes of the value of sulphapyridine in the treatment of plague; if it is used in adequate amount (30–45 gm. total dosage), and if diagnosis has been made early in the disease, good results may be expected. The author insists on the importance of rest in bed during treatment. MATHUR and GOYAL (p. 217) report good results from the use of sulphathiazole in plague. They remark that this is now the standard treatment, which may be supplemented with coramine or other drugs as occasion demands. MAGROU (p. 926) treated 28 cases of plague with sulphadiazine; two of the patients died, but all untreated and unvaccinated cases were fatal. Sulphadiazine is therefore satisfactory, and the concurrent use of serum appears to be unnecessary; the dose given on the first day was, finally, 21 gm., and administration was continued, in diminishing doses, for 10 to 15 days. The drug was given in a large volume of fluid, and with at least 20 gm. of sodium bicarbonate daily to keep the urine alkaline.

WAYSON and MCMAHON (p. 648) have compared streptomycin with sulphadiazine and sulphapyrazine in the treatment of plague in guineapigs and mice. Streptomycin evidently has considerable curative action but is, apparently, not so valuable as sulphadiazine. Sulphapyrazine is not so effective as sulphadiazine. HORNIBROOK (p. 741) also writes of the value of streptomycin in experimental plague; the results in a small series of mice indicated that it was possibly somewhat more effective than sulphadiazine under the conditions of the experiments.

GUPTA *et al.* (p. 1138) found that penicillin was useless in experimental plague in animals.

MACCHIAVELLO (p. 647) has issued a set of instructions for diagnosis, treatment and isolation of patients with plague, and for the collection of suspected material. These must be sought in the original.

Control.

In the *Bulletin of the U.S. Army Medical Department* (p. 739) there is a reference to the outbreak of plague which occurred in Dakar in 1944 [see above]; there were 567 cases, and the case mortality rate was 91 per cent. This account is concerned chiefly with the extensive dusting campaign, with 10 per cent. DDT, which was undertaken to control the epidemic. Practically all persons in the affected districts were dusted, beneath their clothing, at ankles, waist, sleeves, neck and hair; and floors, walls and beds of houses were sprayed with 5 per cent. solution in kerosene. A survey of houses two weeks after treatment showed that almost all were free from fleas. This area is heavily infested with rats, but rat poison was not used because of its danger to children. ROTMAN (p. 34) notes that the French E.V. vaccine was also used as a control measure, and that severe reactions to it were not uncommon. SAVINO (p. 36), on the other hand, has used the E.V. vaccine in Argentina, and remarks that reactions to it were slight.

KALMBACH (p. 331) writes of the value of sodium fluoroacetate (known as compound 1080) in rat control; this compound is extremely toxic to rats and small rodents, but is also dangerous to cats and dogs, and possibly to man. The lethal dose for man is believed to be about one-fiftieth of one ounce; no antidote is known (p. 648). Monofluoracetic acid is the toxic principle of certain poisonous plants in South and West Africa (KLINGENSMITH, p. 648).

RICHTER (p. 331) shows that alpha-naphthyl thiourea (ANTU) is an effective rat poison, and is toxic to other animals. It has been used in a mixture with finely ground maize or wheat, and as a dust either on vegetable foods, or blown in runways or on the surface of water. UPTON (p. 649), however, found that ANTU, when used as a dust in burrows and runways, was relatively inactive against *R. rattus alexandrinus*, even in high concentration.

Charles Wilcocks.

RABIES.

VEERARAGHAVAN, N. **Cultivation of a Protozoal Parasite of the Central Nervous System *in vitro* and its Relationship to Rabies.** *Indian J. Med. Res.* 1945, Oct., v. 33, No. 2, 285–93.

——. **A Rapid Method for the Diagnosis of Rabies in Animals.** *Ibid.*, 295–7.

In a previous communication [this *Bulletin*, 1946, v. 43, 194] the author described certain appearances in smears of the brain of rabid animals, which he interpreted as due to the presence of a parasite supposed to be of a protozoal nature. In the two papers now under review he describes the successful cultivation of this organism in various media prepared from steamed emulsion of brain tissue, and the employment of this culture method for purposes of diagnosis.

One of the most successful media consists of a mixture of six parts of one per cent. sheep-brain extract sterilized by steaming, one part of sheep serum, and two parts of distilled water. The steamed brain extract is prepared from the brain of a sheep. A weighed portion is repeatedly washed in distilled water to remove all blood, and then ground with powdered glass in a mortar to a homogeneous paste. Ice-cold distilled water is then added, while grinding is continued until a 2 per cent. emulsion is obtained. After standing for a short time the supernatant fluid is separated and centrifuged for half an hour at moderate speed. The clear fluid is then steamed in a sterilizer for half an hour on three consecutive days and tested for sterility.

Eight cc. of this medium are placed in each test tube and just before inoculation with material to be tested, 10 drops of an emulsion of fresh brain tissue of a guineapig one to two days old are added to each tube (one part of emulsified tissue and two parts of distilled water). The inoculum is from the clear supernatant fluid of a 20 per cent. emulsion of the brain of the suspected animal, which has been centrifuged for half an hour at 3,000 r.p.m. The cultures were incubated at 37°C. and smears were made at intervals of one hour. In most cases smears made after 4 hours' culture and stained for 1 hour with Giemsa, showed all the forms of the parasite described in the earlier paper. The virulence of the cultures was tested by various filtration processes and subsequent inoculation of animals and fresh culture media. In both cases positive results were obtained. The author maintains that his results substantiate his earlier claim that he has been dealing with the parasite of rabies and that his culture technique affords a more rapid method of diagnosis than that usually employed.

[The author's original statement regarding the nature of the parasite raised doubts as to whether he was dealing with a mixture of rabies virus and some

other parasite rather than with a protozoal organism which was the cause of rabies. His claims in the two papers reviewed here do little to relieve these doubts, which can only be dissipated by further work.]

C. M. Wenyon.

VEERARAGHAVAN, N. **Studies on the Cultivation of the Aetiological Agent of Rabies *in vitro* and its Nature.** *Indian J. Med. Res.* 1946, Oct., v. 34, No. 2, 207–24. [16 refs.]

The author has previously described a protozoal parasite in the central nervous system of animals suffering from rabies, which could also be seen in tissue cultures [this *Bulletin*, 1946, v. 43, 194, and above]. He considers this to be the causal agent of rabies. This view is supported by the present work, in which it is claimed that the causal agent can be cultivated in cell-free media. The medium employed consisted of steamed sheep-brain extract, serum, peptone, and glycerin. To this was added 10 per cent. fresh emulsified guineapig brain, which was stated to contain no intact cells on microscopical examination. The virus inoculum consisted of emulsified infected sheep brain, which had been centrifuged but not filtered. A rise in titre of virus was found after 12 to 24 hours' incubation at 37°C. In only one experiment was the virus inoculum filtered (Ford Sterimat, FCB); here the titre of the culture fluid rose from $1{\cdot}5.10^4$ to 1.10^6 after 24 hours' incubation.

[Where the virus inoculum was not filtered it is probable that sufficient intact cells were present, even after emulsification, to permit of virus growth. In any case, the rise of titre found is not very great, and could be due to release of virus particles from disintegrating cellular material; incubation was not carried out for longer periods than 24 hours, a procedure which might have afforded more satisfactory evidence of multiplication.] *D. J. Bauer.*

VEERARAGHAVAN, N. **Studies on Antirabic Immunization with Culture Vaccine.** *Indian J. Med. Res.* 1946, Oct., v. 34, No. 2, 225–36. [15 refs.]

Tissue cultures of rabies virus, prepared as described in the previous paper, were used as a vaccine after the addition of phenol to a concentration of 0·5 per cent. The immunizing power of this vaccine was tested in guineapigs by a modification of Habel's mouse test [this *Bulletin*, 1941, v. 38, 161], and was found to be equal to that of the ordinary phenolized sheep brain vaccine. It also had the advantage of containing very much less inert brain protein. The titre of the virus contained in it was also higher ($2{\cdot}5.10^6$, as compared with 10^5 in sheep), allowing a much smaller volume to be injected.

[The question as to whether the virus has multiplied or not does not of course affect the validity of the immunity tests, since the cultures were shown to contain virus by guineapig inoculation, It is, however, specifically stated that cultures were not satisfactory unless the original virus inoculum was heavy (36 cc. of 20 per cent. infected sheep brain suspension added to a total volume of 180 cc.) and this, together with the fact that the observed rise of titre was only one power of ten, suggests an increase in the effective number of infective units by disaggregation as much as by actual multiplication.] *D. J. Bauer.*

FREIRE MUÑOZ, C. Virus rábico fijo procedente del virus dominante en Montevideo. Proceso de la mutación y su estado evolutivo actual. [**Fixed Rabies Virus from the Strain prevailing in Montevideo.**] *An. Facul. de Vet.* Montevideo. 1945–1946, v. 4, No. 4, 483–503.

The authorities in Montevideo seem to have had some difficulty in obtaining a satisfactory vaccine against the locally prevailing strain of rabies virus. Advantage was, therefore, taken of the death of a year-old heifer dying of

rabies. This animal had been severely bitten on the head and leg by a rabid dog. In spite of energetic vaccination started three days later, the animal died in 7–8 days, the effect of the inoculations being nil. The virus from this animal was used as the starting-point for obtaining a fixed virus. The process is described in detail, with protocols showing the times of reaction at various stages through dogs first, then rabbits ; and now at the 196th passage a virus has been obtained apparently fixed with an incubation period of 7 days.

H. Harold Scott.

PIEDROLA GIL, G. & DIEZ MELCHOR, F. Algunas experiencias sobre la inmunidad en la rabia. [**Experiments on Immunity to Rabies.**] *Med. Colonial.* Madrid. 1946, Dec. 1, v. 8, No. 6, 423–9.

Preventive vaccination against rabies is one of the milestones along the road of scientific advance, but there are well-known instances in which death has occurred in spite of vaccination in the proper way and started in good time. The authors have, therefore, taken up afresh the study of immunity to rabies and in this paper record two series of experiments.

In the first, they inoculated into rabbits, subcutaneously in 2 cc. doses, increasing concentrations of the laboratory virus, beginning with 1/5,000 and reaching 1/50 by the tenth day. During the next 30 days careful observation was made of temperature, weight, mobility, etc., and then 15 cc. of blood was drawn from the heart and the serum separated. A 1 per cent. emulsion of the virus was added in the proportions of 1 : 1 up to 1 : 8 serum and the tubes placed in the incubator at 37°C. for one hour, then for 24 hours in the ice-chest, after which guineapigs were inoculated intracerebrally with 0·3 cc. and kept under observation for 40 days.

Results showed that the rabbits differed greatly in the strength of antirabic serum they produced ; one would neutralize the virus in a dose of 2 cc. serum, another would need 7 cc. and others would lie intermediate with 2, 4 and 5 cc. Next, the rabbits whose serum was thus protective were inoculated intracerebrally with the virus, but all died, one on the 8th day, five on the 7th day and one on the 6th day (one of the eight had been found dead in its cage the day after the blood had been taken).

In the second series of experiments, rabbits in lots of three were inoculated one lot with 0·4 cc. of 1 per cent. virus emulsion inactivated [? preserved] by quinosol, a second lot with 0·4 cc. of cerebral emulsion 4 per cent. with 1 per cent. phenol ; the third with 0·4 cc. of virus emulsion *plus* rabbit antiserum. The inoculations were repeated at weekly intervals for 35 days (five injections) ; then blood was taken as in the previous experiment. No neutralizing substance was detected in the blood, but nevertheless subdural inoculation was made with 1 per cent. virus. All of the first and third lots and two of the second died on the seventh day, the other one of the second lot on the sixth day.

It is thus seen that antibodies are present in the blood of a rabbit inoculated subcutaneously with rabies virus, but there is no immunity of the central nervous system after repeated inoculation of the same virus intracerebrally.

H. Harold Scott.

PIEDROLA GIL, G. & BENITEZ CALVO, L. A. La glucemia en la rabia experimental del conejo. [**Blood Glucose in Experimental Rabies in Rabbits.**] *Med. Colonial.* Madrid. 1947, Mar. 1, v. 9, No. 3, 222–34, 7 figs.

GREENWOOD, M. **Tenth Report on Data of Anti-Rabies Treatments supplied by Pasteur Institutes.** *Bull. Health Organisation.* (League of Nations.) 1945/46, v. 12, No. 3, 301–64.

This is the tenth and final review of data of anti-rabies treatment supplied by Pasteur Institutes to the Health Organisation of the League of Nations. The

nine preceding reports had been entrusted to the late Colonel McKendrick and this report follows the lines of his work. The report deals with nearly a quarter of a million treated cases with 483 deaths and with the results obtained from the whole series which comprise over one and a quarter million treated cases, with 4,023 deaths. The data have been analysed in great detail by the ten methods of treatment; by race, European and non-European; species of biting animal; evidence of rabies in the biting animal; severity of bite; intervention of clothing; position of bite; delay in commencing treatment; paralytic accidents. In reviewing the results obtained from the data, Professor Greenwood came to the conclusion that a continuation of the laborious task of compilation and arithmetic analysis would never decide whether any vaccine was superior to any other. The main reason for this conclusion was the inability to make any direct comparison between the various methods since each Pasteur Institute, generally, relied on one routine method of prophylactic treatment. It was therefore impossible to get a strictly comparable series of cases—in theory the persons compared, in each treatment group, should be of the same race, have been bitten at the same time by the same species of animal, in the same site and with the same degree of severity and to have come under treatment at the same interval after injury. In addition to this important factor there is the probability that a considerable difference existed in the routine adopted by the various institutes in their follow-up for the after-histories of the patients—CUNNINGHAM and MALONE showed, for Indian data, that complete follow-up was very important. Another possible source of heterogeneity is variation in infectivity of strains of natural rabies in time and place. The very small number of deaths recorded everywhere was also a disturbing factor; regional variations might seriously affect any statistical inference.

Professor Greenwood also reviewed Dr. VAN STOCKUM's theory for judging the efficacy of a vaccine by using the ratio of deaths with an incubation period of less than 31 days to those with a longer incubation period. He found that no decisive conclusion could be drawn in favour of her new statistical method and that the results he obtained did not substantiate her sweeping condemnation of some methods of prophylaxis.

The results of this lengthy investigation do not fulfil the expectation of those who planned the enquiry 20 years ago. The suggestions and criticisms offered by Professor Greenwood should be extremely helpful to those who may plan any further enquiry on this subject. *W. J. Martin.*

RAYNAL, J. H. & LIEOU, Y. C. Vaccin antirabique phéniqué à base de substances nerveuses autres que celles du lapin. Disparition des incidents de choc. [**Elimination of Shock by using Nervous Substances other than Rabbit Tissue in Phenolized Antirabic Vaccine.**] *Ann. Inst. Pasteur.* 1946, Sept.–Oct., v. 72, Nos. 9/10, 832–3.

The following is a translation of the authors' summary.

To avoid the accidents recorded during preventive treatment of rabies by phenolized vaccine, it is advisable to avoid the use of rabbit brain in preparing the vaccine. Dog or sheep brains may be used with advantage; in addition, the virulent nervous substance of the latter constitutes a better antigen than that of the other animals. *H. J. O'D. Burke-Gaffney.*

ZABLUDOVICH, S. Accidentes por vacuna antirrábica. Sindrome pseudo peritoneal y parálisis facial bilateral sucesiva. [**Accidents following Vaccination against Rabies: Pseudo-Peritoneal Syndrome and Bilateral Facial Paralysis.**] *Día Médico.* 1946, Sept. 30, v. 18, No. 40, 1454, 1456–8. [33 refs.]

BUSSELL, L. J. **Myelitis after Antirabic Vaccine. Report of a Fatal Case.** *Lancet.* 1946, Dec. 7, 826–7, 4 figs.

A Sudanese soldier was bitten on the left hand and right ankle by a stray dog, later found to be "mad", on September 3, 1944. He was given courses of carbolized sheep-brain antirabies vaccine between this date and September 10, and again from October 31 to November 14. On November 18, he developed pain and fibrillary twitching in the left upper arm and shoulder. The temperature was raised. On November 21, neck rigidity and head-retraction developed, and there was a complete flaccid paralysis of the left arm. Kernig's sign was positive. The patient died on November 22, with head retraction, fibrillary twitching in right arm, chest, and abdominal muscles; there were spasms of the facial muscles, and he could not articulate or swallow properly. The CSF showed a cell count of 120 per cmm., chiefly lymphocytes. Pathological investigations were carried out by Professor Vittorio Cilli at Asmara. The brain was virtually normal. The cord showed an acute haemorrhagic lymphocytic myelitis with spinal leptomeningitis. Some ganglion cells, especially in the left anterior horn, showed degenerative changes. No rabies virus was isolated from brain material by subdural inoculation in rabbits.

[Neuroparalytic accidents after anti-rabies vaccination are usually divided into the Landry type, the dorso-lumbar paralytic type, and the neuritic type. The features of this case would appear to classify it in a fourth group, with meningeal signs, as described by GORDON and referred to by REMLINGER (this *Bulletin*, 1938, v. 35, 653).] *A. J. Rhodes.*

PASSOUANT, P. & KREISBERGER, J. Polyradiculonévrite après vaccination antirabique. [**Polyneuritis following Anti-rabic Vaccination.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1946, Nos. 18/19, 295.

MALARIA.

FONTAN, A., VERGER, P., MOULIÈS, A. & MARTIN, C. Sur un cas de paludisme autochtone de la région bordelaise, observé chez un nourrisson de 6 mois. [**An Autochthonous Malarial Infection in an Infant in the Bordeaux Area.**] *J. Méd. de Bordeaux.* 1947, Mar., v. 124, No. 3, 128.

A severe *P. vivax* infection occurred in a 6-months-old infant near Bordeaux, where malaria has scarcely existed for many years. After a prolonged investigation, the source of the infection was finally traced to a German prisoner working in a neighbouring farm, who had suffered from malaria in North Africa.
H. J. O'D. Burke-Gaffney.

KOUSSITASSEFF. **Malaria in Bulgaria.** *Bull. Office Internat. d'Hyg. Publique.* 1946, July–Aug.–Sept., v. 37, Nos. 7–8–9, 647–8. [French version 645–6.]

The climate of Bulgaria is sub-tropical, and in many other respects it provides conditions favourable to the dissemination of malaria. The low-lying country, alluvia of various rivers, and the marshes bordering the Danube and the Black Sea, favour mosquito breeding; among the five prevailing anopheline species, three are known to transmit malaria, namely *A. maculipennis*, *A. superpictus* and *A. sacharovi*, having respective indices of infection of 0·8, 1·5 and 2·5 per cent.

A. maculipennis is the most widely distributed and the most dangerous vector: *A. sacharovi* is most abundant near the Black Sea: and *A. superpictus* is found in the Southern area, the hill-covered regions and the sub-Balkan districts; it appears later, in July, when the streams begin to dry up and transmits malaria in the late summer and autumn when the "tropical malaria" is in evidence.

The people work in the fields in summer, often spending the night there, and much of their activity is devoted to the cultivation of rice. Furthermore, the pottery and mining industries, quarrying, and railway construction, lead to the formation of many ponds and marshes, so that mosquito-breeding is extensive. Many of the inhabitants are poor and ignorant and do not screen their houses. Splenic indices are estimated every spring in children of 1 to 14 years. In 1945, some 138,000 children were examined and the average splenic index was 9, compared with 16·2 in 1942. The parasite index for over 200,000 blood examinations was 27·2 per cent., compared with 44·8 in 1942. Both splenic and parasite indices have, in fact, been falling steadily during the last four years. Mortality from malaria is also stated to have decreased rapidly in recent years. In 1945, there were 7 deaths from malaria and 6 from blackwater fever (previous figures are not given). The decrease in malaria morbidity and mortality in 1945 is attributed largely to "the anti-malaria measures imposed". [It is to be regretted that means whereby these high figures were successfully reduced are not stated in an otherwise informative paper.]

H. J. O'D. Burke-Gaffney.

LUPPOVA, N. N. [**Malaria in the Chuvash Republic during the Great Patriotic War.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 25–35. [In Russian.]

The author describes the epidemiological conditions relevant to malaria in the Chuvash Republic (Volga region) during the last war.

Among the factors affecting its spread, some were favourable, others were not. Thus, an increase of the mosquito-breeding area, migrations of the population and the curtailment of anti-malaria measures, tended to increase the incidence. On the other hand, meteorological conditions in 1941, 1942 and 1944 had a harmful effect on the development of mosquitoes, but helped to preserve the livestock; furthermore the immigrants, comprising 10 per cent. of the local population came from areas where the incidence of malaria was not higher than that in the Chuvash region. These factors counteracted the effect of those which favoured the spread of infection, with the result that the incidence of malaria in the Chuvash republic during the war did not exceed the incidence before it, and dropped considerably in 1945 as the result of improved anti-malarial measures.

C. A. Hoare.

BEKLEMISCHEV, V. N. [**The Influence of Migration on Malaria during the Great Patriotic War and the Necessary Control Measures.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 3–24. [In Russian.]

The rôle played by the re-shuffling of the population in the production of epidemic outbreaks of malaria is well-known, and acquires particular importance during the post-war period. While the medical authorities of Britain and the United States are concerned about the introduction of malaria by returning troops and prisoners of war, in the Soviet Union the problem is more complicated owing to mass movements of both the population and troops, following military operations which involved almost the entire country.

The author first considers various types of migrations and their possible effect upon the local malariological situation. In the course of these migrations,

contact is established between two communities: (*a*) the local inhabitants; and (*b*) the immigrants. From the point of view of the incidence of malaria in these respective elements, all cases of migration can be divided into five groups characterized as follows:—

(1) The infection rate of the immigrants is low, while that of the local inhabitants is high. In this case the incidence of malaria among the former increases until it attains that prevalent among the latter. Severe outbreaks are liable to occur among non-immune immigrants, with fatal results in the case of subtertian malaria. However, if the immigrants introduce new strains of the parasites, these may cause outbreaks among the local inhabitants, whose immunity protects them only against the indigenous ones.

(2) The infection rates of the immigrants is high, while that of the local inhabitants is low. In this instance, there will be an increase in the registered numbers of cases among the immigrants because of the development of clinical manifestations and possibly relapses. In the absence of local vectors, this will be the only consequence of immigration; but if means of transmission are present, malaria is likely to occur among the local inhabitants, gradually declining until the former recognized incidence is reached.

(3) Each community is heavily infected. In this case, the incidence of malaria might increase in both groups as a result of an exchange of strains of parasites.

(4) Each community is lightly infected. In this case, the effect of immigration will be somewhat masked, but there might be an exchange of strains of parasites.

(5) The immigrants occupy uninhabited or isolated areas. The infection rate of such a community will depend upon the incidence of malaria already present among the immigrants and upon the local conditions of transmission.

The author goes on to discuss the measures of control to be undertaken at the points of departure, during the journey and on arrival of the immigrants at their destination.

This theoretical consideration is followed by an account of migrations of the population which have actually taken place within the U.S.S.R. during 1941–1945 and which may be expected in the future. These movements are described under the following headings: (1) Migrations not connected directly with the army and military operations: evacuations, establishment of new industrial centres, involving transfer of workmen; immigration into new localities; removal of population by the enemy; escape of inhabitants into guerilla settlements. (2) Migrations directly connected with the army and military operations: movements due to mobilization, garrisoning localities in the rear, transportation of troops in general, movements of own and enemy troops, temporary evacuation of the population from the battle-front, movements in connexion with guerilla warfare. (3) Migrations after the termination of the war: demobilization, return of prisoners of war, repatriation of displaced people.

Since, up to 1945, the war on the eastern front was conducted chiefly in malarious areas, the foregoing migrations played an important epidemiological rôle in the spread of malaria in the Soviet Union. The position brought about as the result of the war provides examples predicted in the foregoing theoretical analysis and dealt with in some detail. *C. A. Hoare.*

SIERRA LEONE. **Report on Malaria in Freetown and District.** [TURNER, J. G. S., S.M.O.(H.) & WALTON, G. A., Medical Entomologist.] 21 pp. 1946. Freetown: Govt. Printer & London: Crown Agents for the Colonies, 4 Millbank, S.W.1.

This report summarizes the more important observations concerning malaria in Freetown that have been recorded since 1900. The present population of Freetown is about 80,000; only some 30 per cent. of that population were

born in Freetown. The general sanitary level of the town is low. Several thousand cesspits receive most of the night soil and grossly sewage polluted streams are used for washing clothes and bathing. Many streets are bare uneven laterite rock which hold water throughout the rains ; this water provides facilities for the breeding of *A. gambiae* in large numbers.

The malaria vectors in and around Freetown are *A. gambiae* (which predominates), *A. melas*, *A. funestus*, *A. hancocki*, *A. hargreavsi* and *A. nili*. Other anophelines found are *A. coustani*, *A. freetownensis*, *A. rhodesiensis*, *A. smithii*, *A. barbarellus* and *A. domicolus*. The major malaria carriers are *A. gambiae* and *A. melas*. Both species are prevalent in the western end of Freetown and as the prevailing wind is westerly there is a drift of both species, with a low to moderate infection rate, to ships in the estuary. At times shipping may be affected by *A. melas*, with a low infection rate, blown from the north, and by *A. gambiae*, with a high infection rate, blown from the south, or town. After strong winds, ships lying two miles from the shore complain of mosquito infestation.

For five months in the year conditions are ideal for the breeding of mosquitoes and the transmission of malaria. During the other seven months, the streams and seepages maintain a moderate density of anophelines and transmission of malaria is always possible.

The improvement in malaria conditions that has taken place since the beginning of the century is illustrated by the drop in the estimated yearly number of bites by infected mosquitoes per person. To calculate this figure the mean female anopheline bedroom density in the area is multiplied by the mean sporozoite rate, multiplied by 365 and divided by the average number of persons per room. From 1900 to 1941 the estimated number of infected bites per person per annum fell from 50 to 3 but the reduction in anopheline density was insufficient to cause any marked drop in malaria transmission. By 1944 estimated infected bites had fallen to one per person per annum, and this corresponded to a mean parasite rate in the untreated child population of about 25 per cent. Spleen and parasite rates show a steady fall in the incidence of malaria in recent years ; the central part of the town is relatively safe when compared with suburbs and rural areas. During 1944 the combined use of mepacrine, of dress precautions, of pyrethrum sprays, of gauze protected quarters, etc., reduced the risk of malaria in the army from a probable rate of 1,000 per 1,000 to 73 per 1,000 per annum.

All four species of malaria parasite occur in Freetown. At the present time *P. falciparum* is dominant ; it is the cause of 99 per cent. of infections. *P. malariae* is found in about 0·5 per cent. of cases. *P. vivax* and *P. malariae* are both very uncommon. An epidemic of *P. malariae* malaria occurred in the recent past : in the three years 1931 to 1935 it was responsible for from 57 to 69 per cent. of all malaria infections. There was no increase of hospital attendances during these years so one must assume that the temporary dominance of quartan malaria suppressed coexisting *falciparum* infections.

A complete résumé of the mass of information in this report is not possible.

Norman White.

MONTESTRUC, E. Le paludisme à la Martinique. [**Malaria in Martinique.**] *Rev. Paludisme et Méd. Trop.* 1947, Feb. 15, v. 5, No. 33, 33–9.

Malaria has apparently existed in Martinique since the early days of the French occupation, but early reports referred to by the author give but little precise information as to the extent and intensity of its prevalence in the island. In the last two months of 1942, the author examined 1,295 schoolchildren in 26 schools. Malaria parasites were found in 36, 34 *P. falciparum*, 2 *P. vivax*, a

parasite index of 2·8 per cent. On the east coast no evidence of endemic malaria was found north of Sainte-Marie. On the west coast Saint-Pierre, Carbet, Case-Pilote, Schoelcher and Fort-de-France appeared to be free from malaria. Malaria was present in all inhabited localities on the south coast except Marin. The prevalence of malaria varies from year to year but is never very high.

The spleen index of the schoolchildren mentioned above was 3·8. There was a discordance between the parasite rates and spleen rates due to the fact that schistosomiasis (*S. mansoni*), which is much more prevalent in Martinique than is malaria, also causes hypertrophy of the spleen.

It appears that *A. tarsimaculatus* is the chief, if not the only, vector of malaria.

Norman White.

MACKERRAS, I. M. **The Australasian Anophelines as Vectors of Malaria.** *Med. J. Australia.* 1947, Jan. 4, v. 1, No. 1, 1–8. [27 refs.]

The factors which make for success in malaria transmission by anopheline mosquitoes (susceptibility to infection, abundance, association with man, avidity for human blood and longevity) are discussed in a general way and then considered more particularly with reference to certain Australasian species.

The author lists these species in the following approximate scale of importance as: proven dangerous vectors, *Anopheles punctulatus punctulatus*, and *A. p. farauti*; potential vectors under locally favourable conditions, *A. annulipes*, *A. bancrofti bancrofti*, *A. subpictus*, *A. amictus hilli* and *A. a. amictus*; unknown but locally significant, *A. maraukensis* and *A. novaguinensis*; but it is not safe to conclude that each species behaves similarly throughout its range.

A. punctulatus has numerous local populations each differing a little from the others and with two or three main races of which *A. p. punctulatus* and *A. p. farauti* are clearly recognized. *A. p. farauti* occurs on all the larger and most of the smaller islands north of Australia from the Moluccas to the New Hebrides. On the mainland it is found in north-east Queensland and scattered in the Northern Territory. *A. p. punctulatus* is more restricted in range, being absent from New Hebrides and from the mainland of Australia.

The intermediate forms such as *koliensis* seem to occur wherever the others are present together but have not been recorded where either is alone. The biology of *koliensis* is worthy of further investigation, but the weight of evidence seems to show that it is a hybrid.

A. annulipes is presumed to be the vector of sporadic malaria in the south, for, though the species exhibits no particular association with man, yet it is capable of malaria transmission, as, for example, when a camp is established near its breeding place and other conditions are suitable.

A real danger that should be widely recognized is the possibility of the introduction of the highly efficient vector *A. p. punctulatus* from the islands into the tropical, humid regions of the northern part of the Australian mainland.

H. S. Leeson.

WHEELER, A. H., MCDERMOTT, Elizabeth B., ADLER, J. & KAHN, R. L. **Studies on Serology of Malaria. II. Hemoglobin Precipitation with Lipid Antigen.** *J. National Malaria Soc.* 1946, Sept., v. 5, No. 3, 209–22.

HULL, R., LOVELL, B. J., OPENSHAW, H. T. & TODD, A. R. **Synthetic Antimalarials. Part XI. The Effect of Variation of Substituents in Derivatives of Mono- and Di-Alkylpyrimidines.** *J. Chem. Soc.* 1947, Jan., 41–52.

PETERKIN, G. A. G. & HAIR, H. C. **Preliminary Report of a Dermatosis due possibly to Mepacrine. A Description of 26 Cases seen in Italy.** *Brit. J. Dermat. & Syph.* 1946, Nov.–Dec., v. 58, Nos. 11/12, 263–71, 4 coloured figs. on 2 pls.

In 3 of these cases mepacrine caused an exacerbation of the eruption. The authors do not consider that the low incidence of the eruption following the use of mepacrine justifies a contraindication to the general employment of that drug.

H. J. O'D. Burke-Gaffney.

ROBIN, C. & BROCHEN, L. Le paludisme à Dakar. Résultats d'une campagne curativo-préventive antipalustre, à l'aide des médicaments synthétiques, en milieu indigène. [**Malaria in Dakar. Results of the Therapeutic and Prophylactic Administration of Synthetic Drugs in a Native Population.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1946, v. 3, No. 1, 97–108.

Anopheles gambiae and *A. pharoensis* occur in Dakar, the former predominating. Parasite indices reported in 1919, 1922 and 1929 were 39, 42·3 and 24·1 per cent., respectively. These were all determined in the endemic season. The considerable decrease in malaria prevalence noted in 1929 followed energetic measures taken against *Aëdes aegypti*, because of an outbreak of yellow fever. The improvement was not long maintained. At the beginning of 1943, 599 of 1,105 (54 per cent.) schoolchildren aged 5 to 16 harboured parasites. Towards the close of that year (epidemic period) 262 (65·5 per cent.) of 400 children of similar ages were infected. In July 1945, two groups each of 350 children aged 6 months to 6 years had parasite rates of 68 and 60 per cent. About three-quarters of the infections in these groups were caused by *P. falciparum*, the remainder by *P. malariae*.

In 1943, work was started in creating a protected area around Dakar but much remains to be done. Once it has been completed the attempt will be made to eliminate the human carriers of infection in the city. In the meantime efforts were directed towards dealing with native infants and young children, the most important sources of infection, in a heavily infected part of the town. Two hundred and twenty-three children were treated with quinacrine and rodoprequine between the 30th July and the 1st of December. The treatment began and ended with three days quinacrine followed by three days rodoprequine. In between these two courses quinacrine or rodoprequine was given on 10 days at various intervals : drugs were given on 22 days in all. Quinacrine tablets each contained 0·1 gm. ; rodoprequine tablets 0·01 gm. Children aged 0 to 1 each received half a tablet ; 1 to 3 years, one tablet ; 3 to 5 years, one and a half tablets ; 5 to 6 years, two tablets. The reduction in parasite and spleen rates was marked. The very few children who harboured parasites at the end of treatment had been irregular in their attendance at the dispensary. Enlargement of the spleen caused by *P. malariae* rapidly disappeared.

Norman White.

DICK, G. W. A. & BOWLES, R. V. **The Value of Plasmoquine as a Gametocide in Sub-Tertian Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 447–50.

The observations recorded relate to a group of adult Somali enlisted soldiers and to the Somali inhabitants, of all ages, of an isolated village in the Nogal Valley. All patients suffering from *P. falciparum* malaria were treated with quinine sulphate in a mixture, 10 grains *t.i.d.*, for 3 days, and then atebrin 0·1 gm. *t.i.d.* for 5 days. Every alternate patient showing crescents in the peripheral blood at the completion of this treatment were treated with plasmoquine 0·01 gm. [frequency not stated, but presumably *t.i.d.*] for 3 days. Sodium

citrate, 30 grains, was given with each dose of plasmoquine. No toxic effects were noted. Reduced doses of all drugs were given to children.

In the adult Somali group, the average survival of crescents was over 9 days from the completion of the atebrin treatment, and over 12 days in the Somali village group of all ages. For those treated with plasmoquine the mean survival period of crescents was 3 days in the adult group and 2 days in the village group, from and including the day on which plasmoquine was commenced. In all, 46 patients were treated with plasmoquine. *Norman White.*

GRAINGER, W. E. **The Experimental Control of Mosquito Breeding in Rice Fields in Nyanza Province, Kenya, by Intermittent Irrigation and other Methods.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 16–22.

A wartime increase in the amount of wet rice grown in Kenya provided an opportunity, and the need, to test methods of anopheline control; and to measure, at the same time, their effect on the crop.

Intermittent irrigation tested over two years with cycles varying from 3/10 to 5/9 irrigated/total days produced no observable reduction in the number of pupae, or it is assumed, of adults. Stocking with larvivorous fish, *Gambusia affinis holbrooki* yielded no apparently useful results. An oil-drip arranged over the inlet channel was of real value, reducing the average catch of pupae to less than one-tenth of the control plot figures.

The effects on the rice crop are presented in two tables of seasonal results, showing the weight of grain and of straw, the average height of crop and the average number of "tillers" or side shoots. The variations are too great to permit comparison. It is clear from the first season's results that intermittent irrigation cannot be cleared of the charge of decreasing the yield of the crop. *G. Macdonald.*

FLOCH, H. & ABONNENC, E. Poissons larvivores de la Guyane Française. [**Larvivorous Fish in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 132.* 1946, Aug., 6 pp., 2 figs.

MATHIS, W. V., FERGUSON, F. F. & SIMMONS, S. W. **Comparative Studies of DDT Dusts, DDT-Oil Sprays, and Paris-Green Dusts used routinely in Anopheline Larvae Control.** *Pub. Health Rep.* Wash. 1947, Jan. 17, v. 62, No. 3, 95–102.

This paper presents an analysis of the comparative values of DDT dust, sprays and mists and paris green in anopheline mosquito control. Standard techniques were used to distribute them, and to measure their efficacy. The dose of DDT aimed at with all preparations was 0·1 lb. per acre, and of paris green 1 lb. per acre.

Powdered DDT was applied in the form of a 1 per cent. mixture, at first with a kaolin type clay, later with pyrophyllite. For surface spraying, the preparation used was a quick spreading emulsion of a 1·25 per cent. solution of DDT in fourteen times its volume of water, distributed at the rate of 15 gallons per acre by knapsack sprayers. The mists were developed from a solution of 1·25 per cent. DDT, 0·5 per cent. B-1956 in fuel oil, by spraying into the air from a pressure sprayer working at 30 to 50 lb. per square inch and fitted with an atomizing nozzle.

The relative efficiency of the four methods is assessed in a series of tables which may be summarized as follows :—

Preparation	Larval reduction at 24 hours	Larval reduction at 1 week
DDT in kaolin	99 per cent.	57 per cent.
DDT in pyrophyllite	84 ,,	16 ,,
Paris green in lime	72 ,,	24 ,,
DDT spray	98 ,,	82 ,,
DDT-in-oil mist	84 ,,	82 ,,

Analysis of the labour and transport involved in the different methods showed that for all types of work the mist was cheapest in labour costs, and the spray entailed least use of transport. The authors consider that the mist is the most generally useful method. These comparative values are illustrated in the following table :—

Comparison of larviciding operations in terms of dosage of active ingredients and man-hours involved.

Larvicide	Ditches 10 feet or less in width		Ditches and ponds greater than 10 feet in width	
	Man-hours/ 100 linear ft.	Pounds/ 100 linear ft.	Man-hours/ acre	Pounds/ acre
DDT-oil emulsion ...	0·13	0·0016	4·10	0·05
DDT-oil mists	·06	·0038	1·70	·13
DDT dust	·10	·0056	3·74	·24
Paris-green dust ...	·09	·04	3·10	1·71

(All figures based on records from March 1st to October 19th, 1945).

G. Macdonald.

Ferguson, F. F., Arnold, E. H. & Upholt, W. M. **Control of Anopheline Mosquito Larvae by Use of DDT-Oil Mists.** *Pub. Health Rep.* Wash. 1947, Feb. 28, v. 62, No. 9, 296–302.

The commonly used spray larvicides for mosquito control involve the application of 12 to 16 gallons per acre. One of the first DDT preparations to be used for this purpose was a quick-breaking emulsion ; it was applied at about the same rate. The result was no saving in man power and, although the preparation was very effective, it was rather toxic to fish and other aquatic life.

Experimental tests have been made with air atomizing sprayers applying fuel-oil solutions of DDT at the rate of 1 (U.S.) gal. per acre [equals 4/5 U.K. gallon]. An air pressure of 50 to 30 lb. per sq. inch was used, which gave an output of 3 gal. (U.S.) per hour, and particles from 70 to 220 microns (mostly 100–125), in a 30 to 40 foot swathe with a slight wind. The DDT rates of 0·1 lb. and 0·05 lb. per acre were equally effective whether applied in this fine spray or in a 12 gal. diluted emulsion. Since 0·1 lb. per acre is sometimes toxic to fish, the 0·05 lb. per acre rate is advised for routine treatments.

J. R. Busvine.

Upholt, W. M. **The Inactivation of DDT used in Anopheline Mosquito Larvicides.** *Pub. Health Rep.* Wash. 1947, Feb. 28, v. 62, No. 9, 302–9, 1 fig.

This is an account of laboratory experiments performed to investigate the factors existing in anopheline breeding areas which cause loss of effectiveness

of DDT in larvicides when applied at dosages adequate for high initial mortality and safe to other aquatic life.

It is made clear that inactivation of the DDT in nature is caused by many factors. The greater part of the investigation was concerned with the adsorption of DDT on mud ; many of the experiments are discussed in detail. Adsorption is a slow process and appears to be on the organic components of the mud, as sand is a relatively poor adsorbent. Other points discussed are wind and wave action which drive the DDT preparation to one side and leaves areas clear of DDT ; precipitation, which removes DDT from the water surface ; and volatilization and chemical decomposition, regarding which chemical methods were not sufficiently accurate, when working with such small quantities, to provide conclusive evidence.

It is suggested that it might be possible to find a non-toxic substance to mix with the DDT which might be more readily adsorbed on the mud, thus preventing the adsorption of the DDT itself. *H. S. Leeson.*

Travis, B. V., Maple, J. D., Hurlbut, H. S. & Husman, C. N. **Cub Airplanes in the South Pacific for Application of DDT.** *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 726–8.

" Application of DDT as a mosquito larvicide by means of Cub airplane was demonstrated to be very effective in the South Pacific. No area was observed where *Anopheles farauti* Laveran or *Culex annulirostris* Skuse could not be controlled with an application of 2 quarts of a 5 per cent. oil solution or a 5 per cent. water emulsion of DDT applied by air."

Davey, D. G. **The Use of Avian Malaria for the Discovery of Drugs Effective in the Treatment and Prevention of Human Malaria. II.—Drugs for Causal Prophylaxis and Radical Cure or the Chemotherapy of Exo-Erythrocytic Forms.** *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 453–71. [34 refs.]

This interesting and important paper was inspired by the observations of James [this *Bulletin*, 1937, v. 34, 589] and of Yorke and Macfie [this *Bulletin*, 1925, v. 22, 50] that sporozoite-induced and blood-induced infections of human malaria behaved differently when subjected to the action of anti-malarial drugs. James had already, in 1931, declared his belief that the sporozoites developed in cells of the reticulo-endothelial system before establishing a blood infection. When James and Tate [this *Bulletin*, 1939, v. 36, 339] described the exo-erythrocytic development of *Plasmodium gallinaceum*, and its resistance to quinine, an added significance was given to the previous observations ; and Davey realized that in the search for drugs of value as causal prophylactics it was necessary to concentrate on those which acted specifically on exo-erythrocytic stages of malarial parasites. The paper under review describes his earlier adventures in this quest and is of the greatest value, not only for its absorbing interest, but for its clarity of thought and its scientific thoroughness.

The first part of the paper is devoted to the preliminary experiments designed to give the information on which subsequent chemotherapeutic tests against exo-erythrocytic forms could be based.

The author showed that after the intravenous inoculation of sporozoites into very young chicks, subinoculations of blood from these chicks produced infections up to 15 minutes afterwards. Between this period and 36 hours, subinoculations were negative. From the fact that parasites were shown to be continuously present in the circulating blood between 36 hours and 72 hours, he deduced that these were probably erythrocytic forms. The reason for this deduction is not clear.

The author's next step was an attempt to determine the early history of the inoculated sporozoites. In this he was unsuccessful, except for the finding of two parasites in the spleens of chicks inoculated 30 and 40 hours previously. This work was performed in 1943, before the work of HUFF and COULSTON [this *Bulletin*, 1945, v. 42, 538] had appeared (and before there was access to the still earlier and very similar work of REICHENOW and MUDROW with *Plasmodium praecox* [this *Bulletin*, 1944, v. 41, 190]*). However, enough had been learned to draw certain conclusions.

Thus, in the first place, it had been established that the sojourn of the sporozoites in the blood was too transient to give hopes of attacking them while they were still sporozoites, especially as the sporozoite is a resting phase at a low level of metabolism, whereas most of the successful anti-malarial drugs owe their effect to their action on the metabolic processes of the parasite.

Secondly, this transient blood stage was followed by one of 36 hours' exclusive development in some other tissue, during which it would be possible for a drug to act on the first generation of exo-erythrocytic forms.

Thirdly, parasites were found to reappear in the blood after 36 hours and were then continuously present.

Finally, neither quinine nor mepacrine was found to affect the exo-erythrocytic development at any stage, and so could neither protect nor cure, but pamaquin had some action on the exo-erythrocytic forms of *P. cathemerium* and also acted as a causal prophylactic in human malaria and lowered the relapse rate in benign tertian malaria.

The analogies between the types of avian malaria being studied and benign tertian malaria were now considered sufficiently close to justify a study of the chemotherapy of exo-erythrocytic forms in avian malaria.

The next part of the paper is devoted to these tests and although the original paper must be consulted for the details, an indication is given below of the main results and conclusions.

For all the tests, 6-day-old chicks were employed, each of which received an intravenous inoculum equivalent to one pair of infected mosquito salivary glands.

The action of drugs against exo-erythrocytic parasites was tested by their effect on the course of infection in the test chicks after these were inoculated by the standard methods noted above.

In an untreated chick the exo-erythrocytic forms, scanty at first, multiply rapidly until, by the 7th day after inoculation, or soon after, the brain capillaries may be blocked by them and the chicken dies of a cerebral anoxia. The time of death so caused occurred over a narrow time range of 3 to 4 days under the standard conditions of the experiments, so that the effect of using various test drugs could be easily assessed by their efficacy, or otherwise, in delaying the course of infection and day of death, or by producing actual cure.

All drugs used were given by the mouth, the first dose being administered about two hours before infection, the second three to four hours after and subsequent doses twice daily for five days. The treatments stopped, therefore, one day before deaths in untreated birds would be expected and the drug was thus given full time to produce its action against exo-erythrocytic parasites. The criteria of cure were that the blood of chicks was examined for 3 to 4 weeks after cessation of treatment and, if the results were negative, 1 ml. of blood

*No mention is made here or in the paper of Huff and Coulston of what were probably the first definite demonstrations of pre-erythrocytic forms of *P. gallinaceum* by MUDROW [this *Bulletin*, 1943, v. 40, 116] and by the present reviewer and his collaborators [this *Bulletin*, 1941, v. 38, 413], both in 1940, and by Seetharama IYER, SHORTT and MENON in 1941 [this *Bulletin*, 1942, v. 39, 524].

was inoculated into a normal chick which, in turn, was kept under observation for three weeks.

The action of the various drugs tested is indicated in the paper in tabular form and the original table should be consulted for details, but the most important results may be summarized as follows :—

Mepacrine and quinine apparently are inert against exo-erythrocytic forms of *P. gallinaceum.*

Paludrine is a complete causal prophylactic against *P. gallinaceum* infections, by its action on the exo-erythrocytic forms, provided treatment commences within 4 days of infection with sporozoites.

In other sections of the paper, the author describes the action of various drugs on infections of *P. cathemerium*, *P. relictum* and *P. lophurae*. Some of his speculations with regard to the type of cell invaded by exo-erythrocytic forms in the early and later stages of infection, as well as on other points, may require modification as knowledge accumulates, but they can only be regarded as reasonable deductions from the knowledge in his possession at the time of writing the paper.

As indicated earlier in this review, the paper is a model in the presentation of experimental work and a contribution to the chemotherapy of avian malaria which has led directly to important applications in human malaria.

H. E. Shortt.

DAVEY, D. G. ; CURD, F. H. S. **Researches on the Chemotherapy of Malaria. I. The Biological Approach** [DAVEY]. *Glasgow Med. J.* 1947, Mar., v. 28, No. 3, 67–72. [16 refs.] **II. The Chemical Approach** [CURD]. *Ibid.* 73–9. [13 refs.]

Admirable brief reviews of recent researches, based on the authors' work, frequently summarized in this *Bulletin.*

HAWKING, F. **Activation of Paludrine** *in vitro*. [Correspondence.] *Nature*. 1947, Mar. 22, 409.

It was recently found by TONKIN [this *Bulletin*, 1947, v. 44, 184] that paludrine in concentrations of 2 to 5 mgm. per litre had no effect on exo-erythrocytic forms of *P. gallinaceum* growing in tissue culture. Further experiments with the same drug on these forms and on blood forms of *P. cynomolgi* also grown *in vitro* are now reported. The parasites in the infected monkey blood used consisted of 90 per cent. ring forms, and were classified by the number of pieces of chromatin seen in stained smears. After 41 hours in the control culture, in which the serum of the donor monkey was used, the parasites were again classified as above. The serum of a second monkey, itself innocuous to the parasites, was mixed in other experimental tubes with that of the parasite donor after the animal had received two doses of 50 mgm. paludrine intramuscularly within 24 hours of being bled. The final serum dilutions of the drug-treated animal were respectively $\frac{1}{4}$, $\frac{1}{16}$, and $\frac{1}{64}$ [the actual concentrations of drug present are not stated]. Paludrine was also added to other culture tubes directly to give a concentration of 1 and 2 mgm. per litre of medium. Development of parasites in the latter resembled that in the control tubes, whereas inhibition of growth occurred in cultures containing serum from the drug-treated animal. In comparable experiments with exo-erythrocytic forms of *P. gallinaceum*, similar results were obtained. The conclusion is drawn that paludrine shows antimalarial activity after undergoing change in the body.

J. D. Fulton.

McKee, R. W. & Geiman, Q. M. **Studies on Malarial Parasites. V. Effects of Ascorbic Acid on Malaria** (*Plasmodium knowlesi*) **in Monkeys.** *Proc. Soc. Exper. Biol. & Med.* 1946, Nov., v. 63, No. 2, 313–15. [11 refs.]

Using the method of Mindlin and Butler [*J. Biol. Chem.*, 1938, v. 122, 673] for determining plasma ascorbic acid and of Butler *et al.* [*ibid.*, 1943, v. 150, 453] for determining ascorbic acid in whole blood, the authors found that the average plasma level of ascorbic acid for 20 monkeys (*Macaca mulatta*) parasitized with *P. knowlesi* was only 0·24 mgm. per cent. The average plasma level in non-parasitized monkeys was 0·56 mgm. per cent.

During the course of studies on 120 monkeys, seven, inoculated with parasites, had no plasma ascorbic acid and less than 0·1 mgm. per cent. in the whole blood. The animals were receiving a well-balanced diet. These seven monkeys showed abnormal courses of parasitaemia : there was only a slow rise in percentage of parasites after inoculation and a gradual spontaneous control of the infection. Into four of these animals ascorbic acid was injected intramuscularly ; a significant increase in the number of circulating parasites followed these injections. Withholding ascorbic acid for more than 7 days after infection appeared to give the spontaneously deficient monkeys time to produce an immunity and to control the infections.

Two other monkeys were made ascorbic acid deficient by removing the vitamin from their diet. In them the abnormal course of parasitaemia observed in the spontaneously deficient monkeys was also observed.

These very interesting studies are being continued with simian and human plasmodia. *Norman White.*

TRYPANOSOMIASIS.

Fairbairn, H. & Culwick, A. T. **A New Approach to Trypanosomiasis. With a Statistical Analysis** by F. L. Gee. *Ann. Trop. Med. & Parasit.* 1946, Dec., v. 40, Nos. 3/4, 421–52, 9 text figs. & 37 figs. on 5 pls. [26 refs.]

The authors state that, in the past, trypanosomes " have been regarded rather as fish swimming in a pond, and their reactions to their environment have usually been reviewed from this aspect." The problems of trypanosomiasis can, however, in their view, be looked at from the angle of physical chemistry if the trypanosome is considered as a " partially deformable bladder, free to move within certain limits, . . . and carrying an electric charge which may be either positive or negative." [The last point was established by the reviewer and his colleagues, see this *Bulletin*, 1937, v. 34, 511.]

The authors assume that the trypanosome owes its charge to ionic absorption or adsorption and possibly both, being positively or negatively charged according as it carries an excess of positive or negative ions. This means that the sign of the charge depends on (*a*) the capacity of the flagellate to adsorb ions differentially, and (*b*) the chemical composition of the environment. Since red blood corpuscles carry a negative charge, the positively charged trypanosomes are constantly subjected to attractive forces, and the negatively charged ones to repulsive forces. These will tend to make the positively charged variants (PV) describe paths close to negatively charged red cells, whereas the negatively

charged variants (NV) will move more remotely. On a thin blood film, therefore, one would expect to find P.V. forms in proximity to the red cells and N.V. forms lying apart. That the surface charge of a red blood corpuscle can affect another similarly charged body was shown in the following way. Isolated pairs of red cells were selected in stained films; the distance between their centres and also the extent of deformation of their adjacent borders were measured. When these results were analysed, the deformation was found to vary inversely with the distance between the centres of the red cells. The proportion of P.V. and N.V. forms was then determined on stained films, by the relation of the trypanosomes to the adjacent red cells, and by the salt-concentration test [this *Bulletin, loc. cit.*]. The results were found to be in close agreement.

The same attractive and repelling forces should lead to the N.V. being shorter than the corresponding P.V. forms. This prediction was tested by investigating the length distribution curves of the two variants in *T. rhodesiense* infections. During this work it was noted that apart from the usual differentiation into long and short (stumpy) forms, the " long " forms could be further divided into two morphological groups. In one group the trypanosomes had long narrow posterior extremities, with the kinetoplast some distance from the posterior end, while in the other group the trypanosome had a much blunter posterior end. These groups were independent of the sign of the charge of the trypanosome so that in all, 6 groups could be distinguished—short, intermediate and long, each subdivided into positively or negatively charged types. The lengths of the members of each subgroup were normally distributed about the mean values and, as predicted, it was found the mean value of the P.V. of each group was significantly greater than that of the corresponding N.V.

In an appendix, statistical analysis by an independent worker is given. The composite curves derived from these measurements are broken down into six normal curves with means almost identical with those obtained by the other method.

This heterogeneity of population, the alterations in electric charge which take place during cyclical development in tsetse flies, and the alteration in morphological, chemical and pathological properties which can occur are not ephemeral variations in the properties of a strain, but are of the nature of genetic segregation involving the alteration of heritable characters. They can be explained, in the authors' opinion, only by assuming that trypanosomes undergo syngamy, which produces a heterogeneous population. From a series of observations on living *T. rhodesiense* suspended in Ringer-Glucose solution the authors describe the process as follows:—Two trypanosomes approach each other and intertwine, their centres in contact; after a short time the anterior end of each fuses with the posterior end of the other. This fusiform body elongates and, after a variable period of time, divides at its centre producing two trypanosomes. [Those interested in the question of the validity of this claim to have observed a true sexual cycle should consult the original and examine the accompanying plates. The process, as the authors state, is quite different from that described by VANDERPLANK, this *Bulletin*, 1944, v. 41, 829.]

From these experiments the following results emerge:—Individuals of the three forms—long, intermediate, short—could fuse with others of the same or different groups, but some indication was obtained that fusing occurred only between trypanosomes with electric charges of different sign. The long form can multiply by binary fission, but the intermediate and short forms cannot do so (or only rarely). The latter forms are produced by syngamy between long forms. Syngamy between short and intermediate forms produces long forms. Metacyclic trypanosomes from the salivary glands or tsetse flies also consist of two types, one longer than the other, and also probably of individuals of different electric charge.

[Whether the authors' hypothesis is correct or not it is impossible to say. Its value, however, can be assessed from the extent to which, on the one hand, it can explain known facts and, on the other, can indicate new lines of fruitful work. The second criterion has certainly been fulfilled because a large body of new facts has been amassed, even if their interpretation is still open to discussion and lines for further work have been suggested. Whether the hypothesis can adequately explain known facts is perhaps more questionable. Taking for example the serological reactions of trypanosomes, the authors have considered one case described by the reviewer and his colleagues in which the antiserum prepared against a positively charged variant of *T. evansi* reacted with the homologous trypanosomes but had no effect on a negatively charged relapse variant of the same strain, whereas the antiserum prepared against the N.V. reacted with both. This, they say, is to be expected: adhesion with the P.V. involves the breaking down of the "protective" action of whatever substance inhibits adhesion; adhesion of the N.V. involves this too but, over and above, it necessitates the suppression of the mutual electrical repulsion of the corpuscles and the negatively charged trypanosomes. The anti-N.V. serum has to do all the anti-P.V. serum does and more, so it is to be expected that it would cause adhesion of both variants. From one angle this explanation seems an over-simplification. Adhesion of sensitized trypanosomes differs greatly from the adhesion due to the sign of the electric charge:—electrolyte concentrations are such as to inhibit "charge" adhesion; the presence of complement is essential; *human* red cells must be used as the indicator, and even then the cells of only certain individuals are satisfactory for the test. From another angle the explanation is inadequate. In the paper from which this example was taken, another case was described in *T. brucei* where anti-P.V. serum and anti-N.V. serum each reacted only against the homologous trypanosomes. In a later paper a further instance is given in which anti-P.V. and anti-N.V. sera were again specific. Tsetse flies were fed on one or other of these variants and the salivary glands were later used to infect rats. The resultant infections in the rats consisted predominantly of positively charged trypanosomes, irrespective of the sign of the charge of the trypanosomes on which the flies had fed. Sera prepared against the original P.V. or N.V. had no effect on these positive cyclical substrains (C.S.), but anti-C.S. serum reacted with both substrains and also with the original P.V. and the original N.V. In this case, surely the anti-N.V. serum did *less*, not more, than the anti-P.V. serum.] *J. C. Broom.*

[Comparable experiments on *Sp. recurrentis* will be described in an abstract in the September number of this *Bulletin*.–Ed.]

Packchanian, A. & Sweets, H. H., Jr. **Infectivity of *Trypanosoma cruzi* after Cultivation for Thirteen Years *in vitro* without Animal Passage.** *Proc. Soc. Exper. Biol. & Med.* 1947, Feb., v. 64, No. 2, 169.

The organism was kept on N.N. medium for 81 subcultures.

Dias, E., Laranja, F. S. & Nobrega, G. Doença de Chagas. [**Chagas's Disease.**] *Mem. Inst. Oswaldo Cruz.* 1945, v. 43, No. 3, 495–582, 49 figs. & 2 coloured pls. [80 refs.]

A detailed treatise.

LEISHMANIASIS.

HIRD, A. J. **Kala-Azar : A Description of Four Cases occurring in a Glasgow Hospital.** *Glasgow Med. J.* 1947, Mar., v. 28, No. 3, 80–87, 2 figs. [16 refs.]

A brief review of cases seen in Britain, with an account of four recent ones.

DIDIER, R. Un cas de kala-azar infantile guéri par la diamidine ou 4-4 diamidine diphénoxypentane. [**A Case of Infantile Kala Azar cured by Pentamidine.**] *Algérie Méd.* 1947, Jan., No. 1, 45–8.

SEN GUPTA, P. C. **Cerebral Lesions in Dogs following Injections of 4 : 4′-Diamidino-Stilbene.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 508–10.

OASTLER and FIDLER reported [this *Bulletin*, 1946, v. 43, 1029] central nervous system lesions of a constant type in dogs treated intravenously with solutions of 4 : 4′diamidinostilbene which had been autoclaved at 5 lb. pressure for 20 minutes before use. Spasticity was a marked clinical feature. In their summary those authors suggested that their experimental findings may throw some light on certain neuropathic signs and symptoms occurring in human cases. Reference was made to the findings of NAPIER and SEN GUPTA who described certain neurological sequelae in man following administration of the same drug [this *Bulletin*, 1942, v. 39, 748]. The latter author, in the present note, disclaims any relationship between his own findings and those of the first named authors. He suggests that the results noted in dogs were probably due to the fact that the drug-solutions were autoclaved, " taking for granted that there has been no accidental superimposition of some infection." [In the reviewer's opinion it is quite improbable that autoclaving of the solutions produced any alteration in the drug, since it is the salt of a strong acid, and strong base and boiling of its solutions is carried out during purification. Moreover Oastler and Fidler appeared to be well aware of the possible photochemical changes previously described (this *Bulletin*, 1943, v. 40, 23).] *J. D. Fulton.*

FEVERS OF THE TYPHUS GROUP.

HAMMARSTRÖM, E., HELLSTEN, H. & FÅHRAEUS, J. Serologiska och kliniska iakttagelser vid fall av epidemisk fläcktyfus i Sverige 1945. [**Serological and Clinical Observations in Cases of Epidemic Typhus in Sweden 1945.**] *Nordisk Med.* 1947, Mar. 14, v. 33, No. 11, 700–706, 5 figs. [13 refs.] English summary.

Four hundred cases of typhus occurred in refugees from German concentration camps arriving in Sweden in 1945 ; 104 of these were investigated by the Weil-Felix and rickettsia agglutination methods. Two control groups were also investigated at the same time to determine the limit of agglutinating titre which could be considered normal. The first group consisted of 448 healthy Swedes ; the titre of anti-*OX19* agglutinins exceeded 1/320 only in 0·2 per cent. The second group consisted of 334 refugees in whom no clinical evidence of typhus was present, and who had not had the disease or preventive inoculation previously ; the anti-*OX19* titre exceeded 1/640 in 0·6 per cent. only. The normal limits of agglutinin titre were accordingly taken as 1/320 for the Weil-Felix reaction : 1/5120 was taken as the upper limit of normal in the rickettsia agglutination test.

In the 104 cases investigated, specific agglutinins were demonstrable with the rickettsia test on the 5th day of the disease on an average, but not until the 9th day with the Weil-Felix test. The actual findings were :—

Day of Disease	Percentage Positive	
	Rickettsia Agglutination	Weil-Felix
1–3	50	17
4–6	59	10
7–9	84	40
10–12	100	89

The rickettsia agglutination method therefore seems more reliable as a diagnostic method. *D. J. Bauer.*

REITHMANN, E. Endemisches Fleckfieber im Mittelmeerraum. [**Endemic Typhus in the Mediterranean Area.**] *Beiträge z. Hyg. u. Epidemiol.* 1944, No. 2, 58 pp., 18 figs. [Numerous refs.]

This paper contains little that is new, but the author has prepared a concise summary of the literature dealing with the " endemic " fevers of the typhus group in the Mediterranean area up to about the year 1938.

The sections of the paper in which this information is supplied are entitled " Mediterranean tick typhus (boutonneuse fever) " and " endemic rat typhus (murine typhus) ".

An extensive bibliography is appended, but it contains very few references to work published after 1936. *John W. D. Megaw.*

NORVIIT, L. **On the Electrocardiogram in Typhus Fever.** *Acta Med. Scandinavica.* 1947, Mar. 3, v. 126, No. 6, 565–78, 4 figs. [47 refs.]

Electrocardiographic studies were carried out on 36 typhus patients. The most interesting results were obtained in the four fatal cases in which electrocardiograms were made one to four days before death, and the condition of the heart was examined after death.

The tracing was normal in one case in which there was extensive myocarditis ; in the other three cases abnormalities were observed ; in one of these the myocardium was normal, in another there was very slight myocarditis, and in the third there was a moderate degree of myocarditis.

The author concluded that extracardiac factors must have played important parts in causing electrocardiographic abnormalities.

In 80 per cent. of the 36 patients abnormalities were observed in the electrocardiograms ; most of these were in connexion with the T wave and the S T segment.

A useful bibliography of 47 references is given. *John W. D. Megaw.*

NORVIIT, L. **On Auriculoventricular Conduction Disturbances in Typhus Fever.** *Acta Med. Scandinavica.* 1947, Mar. 3, v. 126, No. 6, 579–88, 1 fig. [27 refs.]

This article is a supplement to the preceding one ; it deals with nine cases in which the P.Q. interval was prolonged. The abnormality first appeared on the 12th to the 20th day of the illness, when the patients' general condition had

already improved. There was no evidence that the phenomenon was associated with any interruption in the patients' progress towards complete recovery.

John W. D. Megaw.

SANTO. Eine quantitative Schnellreaktionsmethode bei Fleckfieber. [**A Quantitative Rapid Test for Typhus Fever.**] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1943, Oct. 25, v. 103, No. 6, 494–508, 1 fig.

The author describes yet another rapid slide test for which he claims that within 12 minutes results can be obtained comparable with those of the standard Weil-Felix reaction. The time needed does not include the separation of the serum. The only apparatus needed consists of hollow-ground glass slides, a small pipette, and a metal loop.

Six dilutions of the serum are made, ranging from 1–3, by multiples of 5, to 1–9,375. To each dilution a crop of *Proteus OX19* is added, and readings are made after 3, 6 and 12 minutes. By taking into account the degree of agglutination, the time factor, and the dilution, it is claimed that reactions corresponding to Weil-Felix titres of 1–200, 1–400, and so on, up to 1–6,400, can be observed.

A preliminary " blitz test " is also described by which negative sera can be eliminated within 20 seconds ; in this a single dilution of 1–5 is used.

Those interested will find details of the technique in the paper.

John W. D. Megaw.

VARLEY, Florence M. & WEEDON, F. R. **Further Study of the Quantitative Complement-Fixation Test as applied to the Serum Diagnosis of Typhus Fever.** *J. Immunology.* 1947, Feb., v. 55, No. 2, 189–92.

The authors describe a further study of the application of the quantitative complement-fixation test of Wadsworth *et al.* [see VARLEY & WEEDON, this *Bulletin*, 1946, v. 43, 210].

The antigens employed were prepared from eight strains of epidemic and four strains of murine typhus ; the antisera were from guineapigs convalescent from five different strains of epidemic- and two strains of murine-typhus infection. All the antigens and antisera were supplied by Dr. Ida A. Bengtson.

There was very little evidence of the occurrence of distinct types of antigens or antisera among the samples tested ; the titres of the epidemic and murine sera were sometimes higher when heterologous types of antigen were used than when the antigens were homologous.

The following examples of the responses obtained have been extracted from the table illustrating the article.

Antisera	Antigens				
	Epidemic		Murine		
	Titres obtained				
	Colombia	Cairo	" T68 "	" Wild Rat "	Wilmington
Epidemic (Colombia)	95–150*	200	167	—	150
Epidemic (N. Africa)	50–51	65–70	—	17	35–40
Murine (Wilmington)	31	43	25–32	67–75	160–190*

* Homologous antigen and antiserum.

It will be noticed that if the Wilmington antiserum had been tested against the Wilmington and one of the epidemic antigens the reaction would have appeared to be type-specific, but the other results shown in the table are opposed to the view that the test can be relied on to differentiate between epidemic and murine typhus. *John W. D. Megaw.*

Pshenichnov, A. V. & Raikher, B. I. **New Type of Vaccine from Typhus Lice.** *Amer. Rev. Soviet Med.* 1947, Feb., v. 4, No. 3, 231–7.

The authors describe an interesting modification of Weigl's method of preparing typhus vaccine from artificially infected lice.

Details of the method are not likely to be of interest except to a small number of workers, and these will prefer to consult the original article.

Brood lice reared in the laboratory were allowed to lay their eggs on human hairs ; the young larvae were fed on a mixture of defibrinated blood and triturated bodies of infected lice ; the mixture was kept in containers covered by epidermal membranes prepared from fresh human cadavers, and the larvae fed greedily through these membranes.

The engorged larvae were fed twice daily on immune human hosts until the 8th or 9th day, by which time they contained enormous numbers of rickettsiae and had reached the stage of transition to " Nymphs No. II ". The nymphs were then allowed to feed on blood until they dropped off the feeding membrane. After starvation for 24 hours the lice and their faeces were ground up in a 0·2 per cent. solution of formalin ; the resulting suspension, after further processing, constituted the vaccine.

The vaccine is claimed to be thoroughly effective ; it is said to reduce the attack rate to 10 per cent. of that occurring among unprotected persons, and no fatalities have occurred among the vaccinated. *John W. D. Megaw.*

Bruneau. Infection naturelle du pou par le virus du typhus murin. [**Natural Infection of the Louse with Murine Typhus Virus.**] Reprinted from *Rev. Méd. Française d'Extrême-Orient.* 1944, Mar., No. 3, 308–10, 2 figs.

Bruneau, J. & Nguyen-Dinh-Diep. Une épidémie de "Scrub Typhus" à Sonla. [**An Epidemic of Scrub Typhus in Sonla.**] Reprinted from *Rev. Méd. Française d'Extrême-Orient.* 1942, Mar., No. 3, 293–301, 28 graphs & 1 plan.

In October 1941, an epidemic of scrub typhus occurred amongst the native garrison at Sonla, French Indochina. A total of 46 cases developed, with 11 deaths. Serological confirmation was made in 37 cases, the *Proteus OXK* agglutination titres varying from 1/300 to 1/5,000. Others were positive up to 1/100 only, except for a single patient who was serologically negative, and who died before further tests could be made.

Although the guard consisted of 139 Annamites and 90 Thais, the former alone were affected : serological tests of the Thai guards were all negative. The authors suggest that the adult Thais possessed an immunity from previous contact with the virus.

The epidemic, which occurred within a period of two months, was strictly localized to the neighbourhood of the blockhouse, which was occupied by the Annamite and Thai native guards alike.

The transmission of the disease is discussed and the authors present arguments in favour of the belief that bugs, notably *Cimex ratondatus*, played a part : these parasites were very numerous and active in the blockhouse.

H. J. O'D. Burke-Gaffney.

BUSTAMANTE, M. E. & VARELA, G. III. Estudios de fiebre manchada en Mexico. Hallazgo del *Amblyomma cajennense* naturalmente infectado, en Veracruz. [**Studies of Rocky Mountain Spotted Fever in Mexico.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1946, June, v. 7, No. 2, 75–8, 1 map. [10 refs.] [Summary in English by the authors.]

" Rocky Mountain Spotted Fever has in Mexico a wide geographical distribution, from the Pacific Ocean to the Gulf of Mexico.

" The authors report the finding of *Amblyomma cajennense* naturally infected with Rocky Mountain Spotted Fever virus in the Municipality of Veracruz, State of Veracruz, Mexico."

YELLOW FEVER.

LEWIS, D. J. **General Observations on Mosquitos in relation to Yellow Fever in the Anglo-Egyptian Sudan.** *Bull. Entom. Res.* 1947, Mar., v. 37, Pt. 4, 543–66, 3 maps. [39 refs.]

This study of the mosquitoes of the Sudan is of great practical interest because most of the southern half is a yellow fever area and many important lines of communication by air, rail and water pass through the country.

Of the 140 mosquitoes known to occur in the Sudan the author lists 66 common species under three headings: (*a*) those that bite man readily (39 species), (*b*) those that are common in some areas but seldom or never bite man (18 species), and (*c*) those about which more information is needed (9 species).

Twelve species are known to be capable of transmitting the yellow fever virus by bite; *Taeniorhynchus africanus*, *Aëdes aegypti*, *A. aegypti* var. *queenslandensis*, *A. simpsoni* var. *lilii*, *A. metallicus*, *A. africanus*, *A. leuteocephalus*, *A. vittatus*, *A. stokesi*, *A. taylori*, *Eretmopodites chrysogaster* and *Culex fatigans*. Two species are able to retain the virus throughout life but are apparently unable to transmit by bite—*Taeniorhynchus uniformis* and *Aëdes lineatopennis*. Two others are unable to retain the virus for more than a short time—*Anopheles gambiae* and *Aëdes apicoargenteus*. Notes are given on the habits of the adults of some of these species and their relation to yellow fever.

An important part of the paper deals with the topography and mosquitoes of the country, divided into faunal areas and discussed district by district; for example the different reaches of the river Nile, the Nuba mountains, the Sadd and so on. From the vast permanent and seasonal swamps known as the Sadd, 63 species, subspecies and varieties have been recorded. The place swarms with mosquitoes and even in winter *T. africanus* and *T. uniformis* are so numerous that on one occasion a collector was able to catch on himself 158 in fifteen minutes.

Representative catches have been made on steamers. During one journey, in July 1945, 929 mosquitoes were taken in seven days. They included six species of *Anopheles* and fourteen culicines; 78 per cent. of the latter were *Culex antennatus* but, says the author, " the 332 remaining on the steamer on the 10th July, for instance, were a mere remnant of the tens of thousands which had come aboard in clouds on the previous evening biting in all parts of the vessel ".

The potential vectors of yellow fever are controlled in the towns and villages situated along the lines of communication. Trains, steamers and aircraft are sprayed, but in some places nothing short of abolishing river traffic altogether would prevent the transport of mosquitoes.

Aëdes aegypti is controlled as part of the normal work of the Public Health Department, but there is also an *Aëdes* inspection unit in each province and one at headquarters which tours the whole country.

Mosquito control in the Sudan has brought about the following results: it has rendered impossible an urban epidemic of yellow fever due to *Aëdes aegypti*; it has virtually exterminated *A. aegypti* from Khartoum; *A. aegypti* has not been reported in steamers for years; domestic mosquitoes in steamers have been greatly reduced in numbers. The author concludes that the chance of yellow fever spreading to the northward is very small. *H. S. Leeson.*

BAILEY, K. P. **A Preliminary Note on the Sylvan Mosquitos of Gede.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 38–41, 1 fig. & 2 pls.

Gede settlement is 65 miles north of Mombasa, 3 miles from the sea, and is surrounded by heavy bush and forest. Since 1941, weekly collections have been made of larvae of mosquitoes from tree-holes and bamboo pots, and of adults from the bush. Since 1945, collections have been made from tree platforms at heights of 30 and 36 feet. In November 1946, simultaneous catches were made on tree platforms, at the base of a tree and in bush outside the forest. The study was made with special reference to yellow fever.

Brief notes are given on the habits of some of the species; those with marked acrodendrophily, *i.e.* which haunt the upper forest strata, are *Aëdes* (*Diceromyia*) *adersi*, *taylori* and *furcifer*. One of these or all three may be the jungle vectors of yellow fever at Gede. *H. S. Leeson.*

PERLOWAGORA, Alina & HUGHES, T. P. **The Complement Fixation Test in Yellow Fever Epidemiology. The Use of Globulin Antigen in Immunity Surveys.** *J. Immunology.* 1947, Feb., v. 55, No. 2, 103–19. [16 refs.]

In former years attempts to devise a satisfactory complement-fixation test for yellow fever had been unsuccessful. Recently LENNETTE and PERLOWAGORA [this *Bulletin*, 1944, v. 41, 211] achieved considerable success with a mouse-brain antigen, but this produced a rather high percentage of non-specific positive reactions with sera which also gave a positive Wassermann reaction. The authors have extracted the globulin fraction from this antigen and found that it is more sensitive and gives 1 per cent. or less of non-specific reactions with human sera. As a rule, neutralizing antibodies appear by the seventh day in yellow fever and are usually detectable for life. Thus positive complement-fixation was only considered specific when neutralizing antibodies were also demonstrable. In the cases studied by the authors, the neutralizing antibodies appeared by the 5th to 7th day, but the complement-fixing antibodies not until about the 14th day and in some cases not until after the 20th day.

Though detailed tests which will indicate the duration of complement-fixing antibodies to yellow fever are as yet incomplete, the antibodies appeared to persist at least 130 days after the onset of disease. Although the complement-fixing antibody is formed after mild inapparent infections as well as after the more severe infections seen in epidemics, it is seldom formed after the inapparent infection produced by the injection of vaccine made from the 17D attenuated strain of yellow fever virus.

The complement-fixation test for yellow fever virus using this new antigen, should prove a useful and simple test for tracing comparatively recent cases of yellow fever in epidemiological studies. *F. O. MacCallum.*

BRITISH GUIANA. **Yellow Fever Service. Medical Department. Semi-Annual Report January–June, 1946** [DE CAIRES, P. F., Chief Officer]. 9 mimeographed pp.

This report covers the period January–June, 1946; the routine anti-*Aëdes* control measures previously described [see this *Bulletin*, 1946, v. 43, 1136] have been continued, with considerable success; for instance, in Georgetown, in spite of heavy rainfall in April–June, the *Aëdes aegypti* house index (for adults, pupae or larvae) fell from 2·19 per cent. at the end of 1945 to 0·32 per cent. at the end of June 1946. Experiments with DDT are being continued, and at Plaisance, a single spraying of houses with 5 per cent. DDT in kerosene was found to be effective for 10 months. The optimum period for spraying is not yet known, however, and it is recognized that eggs may remain viable in roof gutters and elsewhere for several months, and may hatch when rain falls, and that these adults may appear after DDT from the last spraying has lost its efficacy. Evidently there is need for much more investigation, but the author of this report thinks that DDT is one of the very important means for control of *Aëdes aegypti*, as of the mosquitoes concerned in malaria and filariasis in British Guiana. It is now proposed to spray large areas, carrying a population of 35,000, on each side of the Demerara River estuary.

No cases of yellow fever were found during the period; two new viscerotomy posts have been created; vaccination is still carried out in Georgetown. A bonus system for efficient work has been most successful for zone inspectors.

Charles Wilcocks.

PLAGUE.

GRENOILLEAU, G. **Notes on the Plague in Algeria.** *Bull. Office Internat. d'Hyg. Publique.* 1946, July–Aug.–Sept., v. 37, Nos. 7–8–9, 432–44 [French version 419–31.]

It is stated authoritatively that plague has never been endemic in Algeria and has always been imported. Moreover, progressive improvement in the standard of sanitation, and in the organization of transport, combined with the vigilance of port and aerodrome health authorities, have made the epidemic spread of plague increasingly difficult. It may also be said now that, with prompt diagnosis and effective therapy, plague should be "a reality of the past rather than danger for the future." Small and rare epidemics do, however, still occur and by their very rarity afford an opportunity for study of the mode of transmission. The author has studied two such epidemics. The first spread from a patient to 7 members of his family in succession and then either to relations or to visitors, making a total of 185 cases with 97 deaths. The other started as a murine epizootic and affected sixty persons with bubonic plague who were domiciled in different places and had no contact with one another. The first epidemic was not pneumonic, not a case of droplet infection, nor were any rats to be found, alive or dead, to account for the onset and continuation of the outbreak. This epidemic then has led the author to argue in favour of the transmission of bubonic and septicaemic plague from man to man by the human flea *Pulex irritans*. This view receives its support also from the experiments of BLANC and the contentions put forward by RICARDO JORGE. The second epidemic was of the ordinary type and the insect vector was probably the rat flea, *Xenopsylla cheopis*.

Acceptance of the view of transmissibility of plague, on occasion, from man to man by human ectoparasites is easier for anyone who has really seen the extraordinary degree which such parasitism may attain in Algeria. Prophylactic action on this basis is set out clearly in the article and may be given in very abbreviated forms :—(1) Prompt detection and isolation of all suspected cases, including all cases " where the patient has a temperature and presents an adenopathy of unknown cause ". (2) " Disinsectization of all suspected cases and their contacts, of their belongings, and of their homes and the places where they work ". (3) Daily medical supervision of contacts.

The other plague measures recommended follow the usual lines.

W. F. Harvey.

Koenigsfeld, E. G. H. & Nambiar, K. P. S. **Plague-Meningitis.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 474–5.

Report of 2 cases.

Alberto Videla, C. Clínica y tratamiento de la peste. [**Treatment of Plague.**] *Día Médico.* 1947, Jan. 6, v. 19, No. 1, 1–4, 6.

In plague, chemotherapeutic substances are under test. Sulphonamides, still the mainstay of treatment, have passed their trials satisfactorily ; penicillin has apparently been rejected. Streptomycin is a newcomer which has to be proved for both efficacy and safety. In this article, there is a general review of treatment but the dissertation relates especially to five cases of plague which recovered completely under treatment. Two of these were young, a boy of 14 years and a girl of 16 years : the others were adults. Their treatment was varied and comprehensive : they were serious cases of septicaemic plague and one even of plague meningitis, while only one was bubonic. On admission, patients with cardiovascular collapse and hypotension were given immediately an adreno-cortical preparation (10 mgm. 3-hourly up to 30 mgm.) and anti-plague serum (100 cc. intramuscularly in adults, 70 cc. in children for 3 days) [intervals not stated]. Sulphonamide treatment in high dosage, and apparently without sign of renal complication, was begun early, and as auxiliary to this—possibly a factor concerned in the absence of therapeutic complication—there were given : (1) sodium citrate and sodium bicarbonate in water, for thirst, (2) vitamin C and vitamin B. Penicillin was used where pulmonary complication due to secondary infection was feared. The availability, however, of streptomycin afforded an opportunity for its trial in these patients who, in spite of the treatment already used, gave cause for anxiety.

The young girl, a very serious case, received a total of 15 gm. streptomycin intramuscularly in serial daily doses (½ gm. every 3 or 4 hours) of 4, 3, 3, 2, 2 and 1 gm., amounting in total to 15 gm. One of the least complicated adult cases received a total of 9·5 gm. The second child, a boy, in whom cisternal puncture revealed meningitis, had some of his streptomycin administered by this route with surprising effect ; the purulent cerebrospinal fluid rapidly cleared and the meningeal symptoms subsided.

As the author says, five cases, and those rather complicated, do not suffice to establish the value of any drug ; but they do hold out hope for streptomycin. Much work, however, still remains to be done on streptomycin.

W. F. Harvey.

Gordon, J. E. & Knies, P. T. **Flea versus Rat Control in Human Plague.** *Amer. J. Med. Sci.* 1947, Mar., v. 213, No. 3, 362–76. [26 refs.]

A useful review of recent knowledge and experience.

CHOLERA.

GALLUT, J. Recherches sur le potentiel d'oxydoréduction du vibrion cholérique. [**The Oxydo-Reduction Potential of the Cholera Vibrio.**] *Ann. Inst. Pasteur.* 1947, Feb., v. 73, No. 2, 154–68, 5 figs. [12 refs.]

Physical methods have been less used than chemical in the specific differentiation of bacteria. Only one work is known to the author which applies potentiometric methods to the true cholera vibrio, that of SEAL and MITRA [this *Bulletin*, 1939, v. 36, 897]. Gallut has undertaken, for this organism, the systematic study of the potential of oxydo-reduction in different media and under different conditions of culture. The data are expressed in terms of E_h, a measure of the oxidation-reduction potential of the organism referred to the normal hydrogen electrode, which " is obtained by the algebraic sum of the potential of the calomel electrode ($E = +0{\cdot}236$ at 37°) and the measured potential (E_{mes}) which can be positive or negative. His results, briefly summarized, show that the cholera vibrio, cultivated aerobically, impresses on the medium a negative potential attaining spontaneously values as low as −200 millivolts. The vibrio is not to be regarded as a strict anaerobe, however, but as a facultative anaerobe. In different media, ordinary or synthetic and without glucose, the E_h minimum (maximum of reduction) is attained in about 40 hours, remains at this level for some hours and then rises gradually in from 10 to 40 days, during which time the medium is exhausted and the organisms die. Under anaerobic conditions, maintained under vaseline after reconstitution and the addition of reducing agent, the vibrio shows its capacity for developing at the very low potential of −450 mv., that is to say a potential of the order of strict anaerobic bacteria.

The addition of glucose to the medium, if it does not modify the variations of the E_h in the early stage of which the minimum remains approximately the same, manifests itself by a rapid reversal of the sign of the potential to reach to over 500 mv. in absolute value. This coincides with the death of the vibrios resulting from the production of acid. The change of sign of the potential is due to liberation of the cholera endotoxin, which has an E_h of about +350 mv. as compared with a negative E_h of the bacterial bodies of about −200 mv. It is possible to prevent the reduction corresponding to the logarithmic phase of proliferation of the vibrio by vigorous bubbling of air through the medium when the oxydo-reduction potential can be maintained constant at about 100 mv. even in glucose media. In such case, the glucose is oxidized and not fermented.

W. F. Harvey.

BRUNEAU, J. Note sur un vibrion paracholérique [**A Paracholera Vibrio.**] Reprinted from *Rev. Méd. Française d'Extrême-Orient.* 1943, Nos. 4–5–6, 564–5.

The author in 1943 isolated a vibrio from a patient in Ninh-binh, Tonking, who was suffering from typical but non-fatal cholera.

The vibrio corresponded closely to the cholera vibrio in its morphological, cultural and biochemical characteristics, but failed to give specific agglutination reactions with classical anti-cholera sera. It was insensitive to anti-cholera bacteriophage ; Pfeiffer's reaction was negative.

Biochemically it belonged to Heiberg's Class II. Three of five non-agglutinable strains encountered among 700 otherwise typical isolations during a cholera epidemic in Tonking in 1937, resembled the present strain in all respects.

The epidemiological significance of these " paracholera " vibrios is discussed.

H. J. O'D. Burke-Gaffney.

BACILLARY DYSENTERY.

HUNTER, J. K. **An Epidemic of Bacillary Dysentery in Kigezi District, Uganda.** *East African Med. J.* 1947, Feb., v. 24, No. 2, 98–105.

This is an account of an outbreak of dysentery which appeared in the Kigezi District, Uganda, in October 1944. In the administrative sub-section mostly affected (population 18,000) deaths ascribed to dysentery during that month were 308, compared with the usual monthly average of 26. Two thousand and sixy-nine cases came under observation. Only a few specimens could be sent for bacteriological examination, but *Sh. shigae*, the only pathogen isolated, was probably the cause of the epidemic.

Shortage of food doubtless rendered this population particularly liable to infection ; the main vehicle of spread is believed to have been water. Owing to the highly permeable volcanic soil, springs are very rare and rain water, after coursing over the highly contaminated ground, is gathered in collecting pits at the lower end of the compounds. Another probable factor was eating from a communal dish with unwashed hands.

Treatment of the sick and control of the epidemic presented difficult problems. Camps were opened at a number of places, and details of the construction and staffing of these and of the diet and nursing of the patients are described. The death rate in untreated cases was believed to be 55–60 per cent. but this was much reduced by treatment. Comparative figures show that, by treatment which included the use of the sulphonamide drugs, the rate was reduced to about 3–5 per cent.

Sanitary measures comprised the abolition of surface collecting pits, the construction of latrine trenches in each compound, protection of springs, chlorination of water-holes and construction of rain catchments and tanks in the waterless areas. The epidemic came to an end in the early months of 1945.

J. C. Cruickshank.

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

PICK, F. La longévité de l'amibe dysentérique sur le milieu à l'insuline. [**Longevity of Dysenteric Amoebae in an Insulin Medium.**] *C. R. Soc. Biol.* 1946, May, v. 140, Nos. 9/10, 238–9.

In a previous abstract [this *Bulletin*, 1947, v. 44, 582] reference was made to the author's experience with an insulin medium for the cultivation of dysenteric amoebae.

In the present paper, he has compared the longevity of amoebae in insulin medium with that in the classical medium of Dobell and Brumpt from which ordinarily subculture is required every 5 to 7 days. Four series of experiments were made, in which subculture was carried out every 1, 2, 3 and 4 weeks respectively, together with control experiments on media from which insulin was omitted.

A culture of amoebae, deliberately chosen during a period of weakened growth, was employed in the tests.

With subculture every 21 days it was possible to maintain the culture for 10 weeks in the insulin medium, whereas the amoebae died out in media not containing insulin.

It is concluded that regular subculture of amoebae in insulin medium may safely be made every 14 days, instead of every 5 to 7.

H. J. O'D. Burke-Gaffney.

KEEN, P. **Surgical Amoebiasis of the Liver.** *South African Med. J.* 1947, Feb. 22, v. 21, No. 4, 114–19, 8 figs.

Open drainage of an amoebic liver abscess is undesirable, and aspiration, possibly repeated, is generally regarded as curative in most cases of the condition. This has not been the author's experience. Considering the cases at the non-European Hospital, Johannesburg, during the last few years the author finds that the over-all mortality rate has been " well over 50 per cent." (several cases were only diagnosed at autopsy) ; the main cause of death was secondary infection of the abscess cavity. Many patients arrived moribund, treatment having been unduly delayed ; lung complications were common ; insufficient attention was devoted to general management and nursing ; and too much reliance was placed on the allegedly specific treatment of the amoebiasis.

An account is given of the treatment of three more recent cases of amoebiasis of the liver, with extensive abscess formation, in Africans. The site, size and shape of the lesions was first clearly demarcated by radiographs of the patients in various positions, including the inverted, with air in the cavities. In the first two cases, progress was unduly delayed by the hope of effecting cure by repeated aspiration. It was not until closed drainage with a catheter and suction twice daily were instituted that progress was evident. As a result of this experience, the third case was drained much earlier, and in spite of leakage of the contents of a left lobe abscess into the peritoneal cavity, a good result rapidly followed. Penicillin was injected into the cavity daily during drainage and effectively prevented secondary bacterial infection. Blood transfusions were done, 500 cc. of blood being given weekly ; additional quantities were given when falls in the haemoglobin level indicated the need.

A. R. D. Adams.

DACK, S. & MOLOSHOK, R. E. **Cardiac Manifestations of Toxic Action of Emetine Hydrochloride in Amebic Dysentery.** *Arch. Intern. Med.* 1947, Feb., v. 79, No. 2, 228–38, 4 figs.

It is known that prolonged administration of emetine hydrochloride in large doses results in the appearance of toxic signs ; it has not been sufficiently realized that the usual therapeutic dosage may cause serious injury. The margin of safety between the therapeutic and the toxic dosage is small. Nine cases of toxic myocardial changes resultant on emetine therapy are reported in detail ; the outstanding clinical features of these are tabulated, and examples are given of the changes seen on electrocardiography. The dosages of emetine leading to poisoning ranged from 7 to 22 grains ; these were given over varying periods with, in the case of the larger dosages, intermissions in treatment.

The electrocardiographic abnormalities appeared after a lag of one or two weeks and persisted for some months after cessation of the drug. Neuromuscular and gastro-intestinal signs preceded the toxic cardiac signs, and are an indication for the suspension of the drug. To minimize the risk of poisoning the following rules should be observed : patients under emetine therapy should be confined to bed ; the pulse rate should be recorded at frequent intervals, tachycardia being an early sign of toxicity : diarrhoea, fatigue, dyspnoea on exertion, muscular tremors and dizziness should be watched for : an electrocardiogram should be taken before treatment and after the fifth grain of dosage : emetine should not be given unnecessarily, 5 to 7 grains usually being as adequate in producing a result as larger dosages : a period of at least one month should elapse before retreatment, if this is necessary ; and emetine should not be given to patients with suspected organic heart disease.

A. R. D. Adams.

Neal, R. A. *Entamoeba* **sp. from the Syrian Hamster** (*Cricetus auratus*). [Correspondence.] *Nature.* 1947, Apr. 12, 502.

Jhatakia, K. U. & Mankad, K. K. **Incidence of Intestinal Protozoa and Parasites in Routine Stool Examinations.** *J. Indian Med. Ass.* 1946, Nov., v. 16, No. 2, 44–7.

Among 856 patients at Sir Hurkisondas Hospital, Bombay, 49 per cent. had some intestinal parasites.

Wenrich, D. H. **Culture Experiments on Intestinal Flagellates. III. Species from Amphibians and Reptiles.** *J. Parasitology.* 1947, Feb., v. 33, No. 1, 62–70.

Luis Carri, E. Sindromes de repercusión general producidos por flagelados parásitos del intestino. [**Systemic Effects in Parasitism by Intestinal Flagellates.**] *Prensa Méd. Argentina.* 1947, Jan. 31, v. 34, No. 5, 234–40.

The author records three cases. In the first, a girl of 15 years had an epileptiform attack with loss of consciousness, but no tongue-biting or relaxation of sphincters. She had irregularly set teeth, low palate vault and some dermographism, and her faeces contained *E. coli* and cysts of *Giardia lamblia*. Having no atebrin the author prescribed metaquine. Five days later another examination showed cysts of Giardia still present and after another week's treatment cysts of *E. coli* and *Blastocystis hominis*. During the subsequent 14 months of observation, there was not another attack of unconsciousness.

The second case was in a man of 36 years. At the age of six he had fallen and struck his head causing a wound which required stitching. He was athletic and went in for boxing, swimming, Swedish gymnastics and football. Nothing else untoward occurred until he was 31 when he had, during sleep, what his doctor called an epileptiform attack, saying that he had had convulsions, had bitten his tongue and foamed at the mouth. A year later, he had a second attack, a third after a month and thereafter at irregular intervals of a month or so, always when he was in bed. Faecal examination revealed many *G. lamblia*, cysts of *E. coli* and sparse cysts of *E. histolytica*. He was given a course of metaquine and had no attacks for " more than a month " ; they then returned and further examination revealed numbers of Giardia in the stools and, later again, the same with *Iodamoeba bütschlii*, cysts of *E. coli* and, later, *Enterobius vermicularis*. After a further course of metaquine, this time with enterovioform, the parasites were no longer seen. Two months after this treatment was begun, the patient felt much better and had had no more epileptic attacks.

The third patient was a girl of 9 years who suffered from urticarial attacks after certain kinds of food and was found to be passing *Trichomonas hominis*. She was given paroxyl (a pentavalent arsenical preparation) 0·25 gm. daily for eight days followed by atebrin 0·1 gm. daily for a week. Trichomonas was still present in abundance. She was then put on Escomel's turpentine treatment. Parasites and urticaria disappeared. The author concludes that the presence of the flagellate was the fundamental reason for the food causing urticaria. [Not a very convincing series of cases.] *H. Harold Scott.*

Basnuevo, J. G. & Sotolongo, F. Tratamiento de la Giardiasis con Aralen (Cloroquina) (SN-7618)-(W-7618)-7-cloro-4 (4 dietilamino-1-metilbutilamino) quinolina difosfato. [**Treatment of Giardiasis with Aralen.**] *Kuba.* Habana. 1946, Oct.–Nov.–Dec., v. 2, Nos. 10, 11 & 12, 229–32. [10 refs.] English summary.

Twelve out of fifteen patients appeared to be cured. [See this *Bulletin*, 1947, v. 44, 585.]

Quérangal des Essarts, J., Soubigou, X. & Autheman. Note sur trois cas de coccidiose humaine observés à Toulon dont un cas autochtone. [**Three Human Cases of Coccidiosis in Toulon, including One Autochthonous Case.**] *Bull. Soc. Path. Exot.* 1946, v. 39, Nos. 11/12, 418–22.

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Sabalette, R., Dominguez, M. & Iglesias, R. Estudio clinico, hematologico y terapeutico de un brote de fiebre recurrente. [**Study of an Outbreak of Relapsing Fever ; Clinical, Haematological, and Therapeutical.**] *Med. Colonial.* Madrid. 1947, Mar. 1, v. 9, No. 3, 207–21. [39 refs.]

The outbreak referred to occurred in Seville in the summer of 1946 and some 30 cases were systematically studied. In addition to clinical observations, the peripheral blood, the sternal marrow and, in those with neurological manifestations, the cerebrospinal fluid were examined. The louse was probably the vector.

Clinical.—The incubation period ranged between 5 and 10 days. The onset was abrupt, with headache and shivering and, in half the cases, vomiting, sometimes repeated and severe. The fever, with slight morning remissions, was maintained for 3–7 days, and then fell abruptly, perhaps to 36°C. ; rarely a more gradual drop extending over 48 hours was seen. The patients felt better at once, without any of the pre-critical or critical disturbances noted by others. The apyrexial interval might last up to 8 days when, in three patients, a second attack set in. None had a third attack. In those with intense headache, the spinal fluid was under increased pressure but was clear. One patient had profuse diarrhoea of a dysenteric character and one had an enlarged spleen. " Seventy-five per cent." [? 22 or 23 of the 30] complained of pain in the calves which might be very severe and persisted throughout the illness.

Haematological.—All showed some degree of hypochromic anaemia ; red corpuscles were between three and four millions per cmm. ; three patients had less than 3,000,000. Eight had a leucopenia between 3,000 and 6,000 ; sixteen between 6,000 and 8,000 ; five between 8,000 and 10,000 ; and one had 17,000 per cmm. Haemoglobin ranged between 48 and 77 per cent. The reduction in eosinophiles was notable ; in 26 none was seen, one had 2 per cent. and three had 1 per cent. A marked feature was the large proportion of immature leucocytes, promyelocytes, myelocytes and metamyelocytes. Spirochaetes were very numerous, present in every field during the fever. They were likewise common in the marrow smears and in three after subsidence of the fever ; others showed rounded or fragmenting spirochaetes.

Therapy.—The authors obtained excellent results from slow intravenous injection of *chlorarsine*, the abbreviated name of the hydrochloride of 3-amino-4-oxyphenyl-dichlorarsene. The first dose of 5 cgm. was followed in 24 of the patients by disappearance of the fever in 24 hours, and in the others in 36–48 hours. Forty-eight hours after the first dose a second of 7·5 cgm. was injected. No other specific treatment was needed (Fe proved very successful for the anaemia) except in three patients who, having a second febrile rise, were given another dose of 7·5 cgm. The apyrexial periods in these three were 7, 9 and 12 days. The chlorarsine was well tolerated and no untoward symptoms were seen.

H. Harold Scott.

Lebon, J. & Fabregoule, M. Traitement de la fièvre récurrente cosmopolite. [**The Treatment of Cosmopolitan Relapsing Fever.**] *Cahiers Médicaux de l'Union Française.* 1947, Jan., v. 2, No. 6, 5–12. [14 refs.]

Shaul, J. F. & Saferstein, T. H. **Penicillin Therapy in Relapsing Fever. Report of Four Cases.** *U.S. Nav. Med. Bull.* 1947, Mar.–Apr., v. 47, No. 2, 238–43.

Floch, H. & Grimaldi, J. T. Cinq autres observations de leptospirose ictéro-hémorragique en Guyane Française. [**Five Further Cases of** *L. icterohaemorrhagiae* **Infection in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 141.* 1946, Nov., 4 pp.

The authors report five cases of leptospirosis due to *L. icterohaemorrhagiae*, diagnosed in French Guiana, and refer to eight others previously recorded. They claim that this disease is evidently fairly common in that country, and that it is important, not only in itself, but also because it so closely resembles yellow fever. Details of the cases are given. *Charles Wilcocks.*

Shih Lu Chang. **Studies on** *Leptospira icterohaemorrhagiae.* **II. A Critical Study of the Effect of Penicillin on** *Leptospira icterohaemorrhagiae in vitro* **and in Leptospirosis in Guineapigs.** *J. Clin. Investigation.* 1946, Sept., v. 25, No. 5, 752–60. [12 refs.]

Penicillin *in vitro* arrested the multiplication of *Leptospira icterohaemorrhagiae* in doses of 0·4 O.u. per cc. upwards, but even in concentrations of 5,000 O.u. per cc. showed no leptospiricidal effect. The organisms disappeared from the blood of infected guineapigs 3 to 5 days after injection of penicillin, when daily dosages of about 800 O.u. and a serum level of more than 0·2 O.u. per cc. were maintained. The leptospirae remained in the liver, however, even when the dose was increased to 3,000 O.u. daily, and 6 to 8 days after the blood had become negative.

Some of these treated guineapigs relapsed several days after the last dose of penicillin but usually recovered spontaneously. This is attributed to the partial immunity developed in response to the large number of organisms inoculated, and agglutination tests showed that antibodies were present. Penicillin seemed to have some therapeutic effect in infected guineapigs if the treatment was introduced before the appearance of jaundice; after this had developed, no beneficial effects were observed.

On the basis of these observations, the author estimates that a daily dose of 250,000 to 300,000 O.u. is necessary in human cases of the disease; and is of the opinion that the results with guineapigs should not discourage the use of penicillin in human beings suffering from leptospirosis, in whom it is not such a serious infection as in young guineapigs. *E. Hindle.*

Del Sel, M. & Giberti, C. Enfermedad de Weil. Sobre un caso de *Leptospira canicola.* [**A Case of** *Leptospira canicola* **Infection.**] *Rev. Asoc. Med. Argentina.* 1947, Jan.–Feb., v. 61, Nos. 597/600, 37–8.

Alicata, J. E. **Leptospiral Infection among Rodents in Micronesia.** *Science.* 1947, Feb. 28, 236, 1 fig.

Little is known of the incidence of murine leptospirosis in the Pacific Islands. The author previously showed [this *Bulletin*, 1944, v. 41, 578] that it occurs in the Hawaiian Islands, and therefore a preliminary survey was made by him in July–August 1946, under the auspices of the University of Hawaii Pacific

Islands Research Committee, to investigate the matter further: this survey includes a study of two islands of the eastern Carolines, namely, Moen of Truk Atoll and Ponape.

On Moen, three of 22 rats and on Ponape, two of 18 rats examined had leptospirae in the urinary tubules. This finding is illustrated in two microphotographs.

The author states that, as far as he knows, this is the first record of murine leptospirosis in any Micronesian islands, and that it supports the view that Weil's disease in man is also present.

It is suggested that human leptospirosis may be more common in Micronesia than has been believed. The high rainfall and large rodent population are highly favourable to the spread of the disease. *H. J. O'D. Burke-Gaffney.*

GARNHAM, P. C. C. **A New Blood Spirochaete in the Grivet Monkey,** *Cercopithecus aethiops. East African Med. J.* 1947, Jan., v. 24, No. 1, 47–51.

The author found a spirochaete in the blood of a grivet monkey *Cercopithecus aethiops centralis*, in the forest of southern Mau, Kenya Colony, at an altitude of 6,500 feet.

Morphologically the spirochaete resembled those of relapsing fever: stained specimens averaged 17μ in length, and by dark ground examination it was noted that the ends appeared pointed and that the coils averaged eight in number.

White mice, white rats and monkeys were susceptible to infection, but guineapigs and rabbits were not. In white mice, the infection resembled that of *Trep. duttoni* in man, with irregular relapses; neurotropism appeared in one mouse after 3 months' infection; the strain has been maintained in mice, where it has reached the 92nd passage; some increased virulence occurred after about the tenth passage.

Cross immunity tests against two East African strains of *Trep. duttoni* and an Arabian strain of *Trep. recurrentis* were negative.

A man was inoculated with infected mouse blood and spirochaetes appeared in his blood for one day on the 19th day, without febrile reaction.

Transmission experiments with lice (*Polyplax serrata* and *Pediculus humanus*) and ticks (*O. moubata*) failed to reproduce infection in animals.

Earlier records of spirochaetes found in African primates are shown in a table in the text. The author believes that this is the first record of a natural spirochaetal infection in East African monkeys. He points out the consequent need for care in using such animals in experimental work, and the desirability of checking laboratory infections in them by means of cross immunity tests, in order to exclude anomalous simian strains.

It is proposed to name this organism *Spirochaeta harveyi* in honour of Mr. A. E. C. Harvey. *H. J. O'D. Burke-Gaffney.*

HELMINTHIASIS.

J. UNIV. BOMBAY. 1946, Nov., v. 15, Pt. 3, 31–41. **Synthetical Anthelmintics. Part XI. γ-4-Alkoxy-3-Tolyl Butyrolactones** [BHATT, B. L. & NARGUND, K. S.]. **Part XII. γ-4-Alkoxy-2-Tolyl Butyrolactones & Part XIII. γ-2-Alkoxy-5-Tolyl Butyrolactones** [PATEL, N.Z. & NARGUND, K. S.].

THURET, C. & THIBAULT, C. L'oxygène peut-il être utilisé comme vermifuge? [**Can Oxygen be used as a Vermifuge?**] *C.R. Soc. Biol.* 1946, Feb., v. 140, Nos. 3/4, 89–91.

The antihelminthic action was marked only when produced in a form toxic to the host.

STOLL, N. R. **This Wormy World. With Addendum.** *J. Parasitology.* 1947, Feb., v. 33, No. 1, 1–18.

A valuable study, with extensive references, of the probable incidence of the different forms of helminthiasis throughout the world. The complications of the problem are discussed. This detailed paper should be read in the original.

H. J. O'D. Burke-Gaffney.

NAGATY, H. F. **The Incidence of Parasitic Infections among the Labourers of Ras Gharib, Red Sea District.** *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 14–21.

Twenty-three per cent. of 111 persons harboured internal parasites of which *Schistosoma* and *Ancylostoma* constituted 6 and 5 per cent.

BUEDING, E., PETERS, L. & WAITE, Jean F. **Effect of 2-Methyl-1,4-Naphthoquinone on Glycolysis of** *Schistosoma mansoni*. *Proc. Soc. Exper. Biol. & Med.* 1947, Jan., v. 64, No. 1, 111–13.

"2-Methyl-1,4-naphthoquinone markedly inhibits aerobic glycolysis of *Schistosoma mansoni in vitro*. Since glycolysis, rather than oxidative metabolism, appears to be essential for the survival of these organisms, and since the toxicity of 2-methyl-1,4-naphthoquinone for mammalian species is low, the effect of this compound in experimental schistosomiasis has been studied. Results in mice suggest that the compound may act synergistically with subcurative doses of antimonials ('Fuadin')."

BRANDT, J. L. **An Operative Approach to the Treatment of Schistosomiasis mansoni Infections.** *Science.* 1947, Feb. 28, 239–40.

The author refers to his previous preliminary work with FINCH (*Proc. Soc. Exper. Biol. & Med.*, 1946, v. 61, 22) in which adult *S. mansoni* could be removed more easily and in greater numbers from the portal veins of experimentally infected animals which had been heparinized than from those which had not. Many adult worms were recovered from the livers of the heparinized animals: the portal vein of a heparinized rabbit could be aspirated while keeping the rabbit alive.

As a result of this experience, the author studied this procedure as a therapeutic measure. Five rabbits and two monkeys, infected with *S. mansoni*, were subjected to portal vein aspiration under anaesthesia.

It was found possible to aspirate the portal vein of a heparinized monkey and keep the animal alive: the monkeys used showed infections closely simulating *S. mansoni* infections in man, and the lighter this infection, the greater was the number of adult worms recovered.

It is suggested that if heparin can mobilize and localize adult worms in the portal vein and liver, it may be possible to use heparin systematically, thereafter introducing anthelmintics directly into the portal vein: this would tend to produce a large concentration of the drug used in a position where its greatest effect could be exerted.

H. J. O'D. Burke-Gaffney.

HALAWANI, A. **On the Effect of the Delta Isomer of Benzene Hexachloride (Deltaxane) on the Snails Bulinus and Planorbis.** *J. Roy. Egyptian Med. Ass.* 1947, Jan., v. 30, No. 1, 35–41.

Deltaxane is claimed to be effective against *Bulinus* and *Planorbis* in a dilution of 5 parts per million. [See this *Bulletin*, 1947, v. 44, 331.]

DE OLIVEIRA, H. L. & MEIRA, J. A. Sôbre um caso de infecção humana pelo *Clonorchis sinensis* ; considerações a respeito da técnica de exame da bile para o diagnóstico dessa parasitose. [**A Case of Human Infection with *Clonorchis sinensis* : Diagnosis by Bile Examination.**] *Hospital.* Rio de Janeiro. 1946, Oct., v. 30, No. 4, 559–77, 4 figs. [20 refs.] English summary.

A young man of Portuguese descent, who was born in Shanghai, was under the care of the authors in São Paulo, Brazil. He complained of diarrhoea, epigastric pain and anorexia of two years standing, and loss of weight for six weeks.

Investigation of the bile, obtained through duodenal drainage, revealed the presence of eggs of *Clonorchis sinensis* : these were not detected in the stools until repeated examinations were made. The eggs persisted in the bile after a month's treatment with gentian violet, although there was some clinical improvement.

The authors emphasize the value of bile examination as a means of early diagnosis, and describe the technique employed. They also discuss the clinical and pathological aspects of the disease, and the need for keeping a watch for it, especially with the use of bile examination, among Oriental immigrants in Brazil. *H. J. O'D. Burke-Gaffney.*

NASR, M. **The Occurrence of *Prohemistomum vivax* (Sonsino, 1892) Azim, 1938. Infection in Man, with a Redescription of the Parasite.** Reprinted from *Lab. & Med. Progress.* 1941, Nov., v. 2, No. 2, 135–49, 5 figs. [38 refs.]

LARSH, J. E., JR. **The Relationship in Mice of Intestinal Emptying Time and Natural Resistance to *Hymenolepis*.** *J. Parasitology.* 1947, Feb., v. 33, No. 1, 79–84.

KAMALOV, N. G. [**On Infection of Human Beings by Ancylostomidae through Grass.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 68–72. [In Russian.]

The author carried out an investigation on the method of infection with hookworms in an endemic area of Georgia. It was observed that, in certain localities, the infection could be acquired by persons who had never been in contact with the bare earth, and the suspicion arose that the infection might be acquired from grass. Various samples of soil and grass were accordingly examined for the presence of larvae, and experiments were carried out under laboratory conditions. The results are summarized as follows : (1) Soil covered with grass is more favourable to the development and prolonged maintenance of the infective hookworm larvae than bare earth. Sites exposed to direct sunlight are unsuitable to the existence of the larvae. (2) Under suitable conditions of temperature and humidity, the larvae are capable of climbing vertically on blades of grass up to a height of 22 cm. (3) Both under natural and laboratory conditions, only the infective larvae migrate vertically. (4) This migration can take place only in the presence of a thin film of water on the grass ; if this dries, the larvae which had already climbed up will perish. (5) A person coming in contact with moist grass harbouring hookworm larvae may become infected, even when he is wearing shoes and socks. In experiments with hamsters, it was demonstrated that larvae removed from grass actively penetrate through moist socks and invade the skin. *C. A. Hoare.*

Molina, R. D. & Santos, H. A. **Tetrachlorethylene Treatment of Ankylostomiasis.** *J. Philippine Med. Ass.* 1946, Sept., v. 22, No. 9, 385–7. [13 refs.]

"Of 32 patients treated 29 were cured. Practically no untoward effects were noted."

von Brand, T. & Simpson, W. F. **Physiological Observations upon a Larval *Eustrongylides*. X. The Lethal Mechanism of Bacteria.** *J. Parasitology.* 1947, Feb., v. 33, No. 1, 71–8. [10 refs.]

Farooq, M. & Qutubuddin, M. **Epidemiology of Filariasis in certain Parts of H.E.H. the Nizam's State.** *Indian Med. Gaz.* 1946, Nov., v. 81, No. 11, 470–74, 1 map.

A preliminary survey had shown that filariasis was endemic in Hyderabad State in a kidney-shaped area in the centre of the north-east quarter of the State. The present survey was carried out in a small roughly circular area with a radius of 15 miles and its centre at Kamareddy, at the pelvis of the kidney. Twenty-four villages, with a total population of 43,593, were surveyed. A house-to-house search was made for persons with clinical evidence of filariasis, and random samples of blood were taken between 9 p.m. and 3 a.m. to determine the infestation rate in apparently healthy persons. (In the results which follow, percentages are shown in brackets.)

In 692 persons (1·62 per cent.) filarial disease was found: in 615 of them (88) of the cases, the legs only were involved; in 15 (2·16) the hands only; in 35 (5) the legs and hands; in 20 (2·85) the scrotum only, and in 7 (1·0) the scrotum and legs. The disease rate varied from 0·2 to 4·9 per cent. The sexes were equally affected. The highest incidence was in the 46–50 age group: the youngest patient with lymphangitis was 7 years old and with elephantiasis 8 years.

Samples of night blood were taken from 138 persons of the filarial disease group and in only one were microfilariae found. Among 584 persons without clinical evidence of filariasis, 91 (15·5 per cent.) were found infested.

The infestation rates were estimated roughly; they varied from 27 to 447 microfilariae per drop of blood.

The microfilariae were identified as belonging to the species *Wuchereria bancrofti* in 92·4 per cent. of cases and *W. malayi* in 7·6 per cent.

Culex fatigans was the only proven vector. *Mansonia* (*Mansonioides*) *uniformis* and *M.* (*M.*) *indiana* were found to be breeding in the vicinity, but none was found in the human dwellings.

A rational formula for expressing the degree of endemicity, which takes into account microfilarial infestation and filarial disease, was suggested.

L. E. Napier.

Bozicevich, J., Donovan, A., Mazzotti, L., Diaz, A. F. & Padilla, E. **Intradermal and Complement Fixation Reactions elicited by various Antigens in Persons infected with *Onchocerca volvulus*.** *Amer. J. Trop. Med.* 1947, Jan., v. 27, No. 1, 51–62.

The work here recorded continues that of Wright and Murdock [this *Bulletin*, 1944, v. 41, 1054], which included a review of the literature. The present authors point out that most earlier workers on this subject have arbitrarily selected certain antigen dilutions and have not done quantitative antigen titrations to screen out non-specific reactions due to toxicity of the material or to the influence of parasitic infections other than *O. volvulus*. They set out to investigate this question and to determine the efficacy and specificity of antigens made from such readily available filariids as *Dirofilaria immitis*,

Setaria equina and *Litomosoides carinii*. The work of MAZZOTTI and OSORIO [*ibid.*, 957] and of CULBERTSON, ROSE and DEMAREST [*ibid.*, 770] is briefly reviewed. For details of the authors' technique and experiments the paper itself must be consulted. The antigens were prepared by the method of BOZICEVICH and HUTTER [*ibid.*, 1055] for *Dirofilaria immitis* antigen, but modifications were necessary in the case of *Onchocerca volvulus* antigen. Adult worms of this species were obtained by extirpation of nodules from human patients.

The filariids were separated from the nodules by digestion in artificial gastric juice, the technique of which is described. All the *O. volvulus* antigens used were standardized against anti-onchocerca rabbit serum. To eliminate host protein possibly carried over, a control protein solution was made for each antigen, dog serum being used for *D. immitis*, horse serum for *S. equina* and rat serum for *L. carinii*. Saline containing 0·3 per cent. of phenol was also employed as a control, because phenol was used to preserve the antigens.

For the intradermal tests all the antigens and host proteins were used at a dilution of 1 : 8,000, except a second *O. volvulus* antigen which was diluted to 1 : 16,000. The authors injected 0·01 to 0·03 cc. of the solutions used into the forearm and reactions were read 8 to 12 minutes after the injections. No reaction was considered positive unless the diameter of the antigen weal exceeded that of the control by 3 mm. or more. The standards of interpretation of the results are discussed in the paper.

Complement fixation tests were done with antigens from *O. volvulus* and *D. immitis* at dilutions of antigen of 1 : 200 to 1 : 4,000 and dilutions of sera of 1 : 2 to 1 : 32. Complement fixation tests could not be done with *L. carinii* antigen because there was not enough of it, nor with *S. equina* antigen because this had markedly anticomplementary properties even at dilutions of 1 : 2,000.

The authors claim that their results show clearly that *O. volvulus* antigen was more sensitive than any of the others used. The *D. immitis* antigen was the next most sensitive but in intradermal tests it gave false positives more often than the other antigens did. The *L. carinii* antigen was good in some cases but its reactions varied markedly both in the infected and control subjects, the authors suggest that this variation is partly to be explained by the method of preparation of the antigen. A total number of 658 intradermal and 161 complement fixation tests was done on persons suffering from onchocerciasis in endemic areas and on control persons in other areas. The *O. volvulus* antigen was more specific than the others. Out of 50 persons examined at Morganton, N.C., who had never been exposed to onchocerciasis, but who harboured *Trichuris*, *Enterobius*, hookworms, *Strongyloides* and *Hymenolepis*, the false positives obtained at a dilution of 1 : 8,000 with the respective antigens were: *D. immitis* 10; *S. equina* 11; *L. carinii* 6; *O. volvulus* 2. In a group of 209 patients in Mexico City not exposed to *O. volvulus* but of whom 92 were harbouring *Trichuris*, *Ascaris*, *Enterobius*, hookworms and *Hymenolepis*, the number of false positives obtained with the *O. volvulus* antigen was half that obtained with the *D. immitis* and *S. equina* antigens. Complement fixation reactions with *O. volvulus* antigen were positive in all of 60 patients with *Onchocerca* nodules. Out of 53 of these, 49 gave positive reactions with *D. immitis* antigen. When 43 of the control group of unexposed persons at Morganton, N.C., mentioned above were tested with this antigen, 39 gave negative complement fixation reactions, three were positive and one was doubtfully positive. Intradermal and complement fixation tests done on schoolchildren at Tamazunchale, Mexico, not considered an endemic area, gave a higher percentage of positive reactions than those obtained in any other control group; no satisfactory explanation of this result was found. A single skin biopsy in 81 persons with *Onchocerca* nodules showed microfilariae in 40 per cent. of

them. *O. volvulus* antigen at a dilution of 1 : 8,000 gave a positive result in 78 of them (96·2 per cent.). At the same dilution the other antigens used gave a lower percentage of positives, which was even less than that given by a dilution of 1 : 16,000 of the *O. volvulus* antigen.

The authors suggest the use of quantitative complement fixation tests as a method of measuring the efficacy of drugs in studies of the chemotherapy of onchocerciasis. *G. Lapage.*

Nettel F., R. Contribución al estudio del tratamiento de la Onchocercosis. *Onchocerca volvulus* Leuckart, 1893 (Sin : *Onchocerca caecutiens* Brumpt, 1919). [**Treatment of Onchocerciasis.**] *Medicina.* Mexico. 1947, Feb. 10, v. 27, No. 525, 53–69, 6 figs. [46 refs.] English summary.

Kevorkova, V. I. [**On the Method of Diagnosis of Enterobiasis.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 73. [In Russian.]

Where it is inconvenient to make a diagnosis of enterobiasis by making scrapings of the perianal folds and by examining the rectal mucus, especially in the course of surveys, the author recommends the use of a cotton-wool swab. The patient is provided with a swab inserted into a test-tube containing 3–5 cc. of boiled water. In the morning, before rising from bed, he squeezes some of the water out of the swab by pressing it against the wall of the test-tube, then removes the swab and wipes the circumference of the anus with it. The swab, with the material collected in this way, is then returned to the test-tube. On arrival at the laboratory, the swab is thoroughly washed by agitation in the water within the test-tube. The water is then transferred into a centrifuge tube and spun in a hand centrifuge for 2–3 minutes, the supernatant fluid is decanted and the sediment examined microscopically. A comparison of the results obtained with control scrapings showed that the swab method was equally effective. *C. A. Hoare.*

Kuitunen-Ekbaum, E. & Webster, Dorothy. **Trichinosis in Wild Rats in Toronto.** *Canadian J. Pub. Health.* 1947, Feb., v. 38, No. 2, 76–8. [15 refs.]

"An examination of 650 rats, *Rattus norvegicus*, in the city of Toronto showed that 9 rats, or 1·4 per cent., were infected with the encysted larvae of *Trichinella spiralis*."

DEFICIENCY DISEASES.

de Langen, C. D. **Iron-Deficiency in Prisoners of War and Internees of Concentration Camps.** *Acta Med. Scandinavica.* 1947, Mar. 3, v. 126, No. 6, 546–53.

Professor de Langen examined a number of Dutch civilians some months after their release from prison camps in the Netherlands East Indies. Many of these, although restored to their normal weight and showing no signs of vitamin deficiency, complained of persistent fatigue and muscular weakness. All were found to have very low serum-iron values, ranging from 5 to 80γ per cent. (normal 125 to 175γ per cent.) but no, or only very slight, anaemia. It is suggested that this iron-deficiency may be the cause of the weakness and that absorption of heavy metals may be restored to normal far more slowly than other alimentary functions after a prolonged period of starvation.

Dean A. Smith.

WALTERS, J. H., ROSSITER, R. J. & LEHMANN, H. **Malnutrition in Indian Prisoners-of-War in the Far East. A Survey of 2,000 Cases.** *Lancet.* 1947, Feb. 8, 205–10. [34 refs.]

This report summarizes the clinical and laboratory observations made upon 2,000 Indian prisoners-of-war from various camps in the Far East immediately after their evacuation to India.

Clinical findings included gross wasting, massive oedema, macrocytic anaemia, signs of hyporiboflavinosis, nicotinic acid deficiency, neuritic beriberi, amblyopia and a "captivity cord syndrome", which is apparently the same condition as has been called "spastic syndrome" and "pellagrous encephalopathy" [this *Bulletin*, 1947, v. 44, 605]. The only significant differences from accounts previously given of the clinical findings in such released prisoners are: (1) that no scotoma could be demonstrated in the cases of amblyopia [the authors emphasize that this finding must be interpreted with caution as the patients were mostly singularly poor subjects for perimetry] and (2) the colour of the tongue in ariboflavinosis is described as "fiery red" and in nicotinic acid deficiency as "pale mauve." [The "magenta" tongue is usually regarded as a sign of riboflavin deficiency; and "raw-beef" the commonest description of the nicotinic-acid deficiency tongue.] Differences from observations in Germany were more striking, namely, (1) diarrhoea was uncommon, (2) anaemia was macrocytic, and (3) neuropathies were very common.

The results of special investigations are of particular interest, especially in view of the small number of persons in which they have been possible. The more significant observations are summarized in the following table:—

	Prisoners-of-War (mean)		Controls (mean)
	On Admission	On Discharge	
Hb concentration (gm./100 ml.)	10·5	14·3	15·2
Red cells (millions/cmm.) ...	2·74	4·64	5·28
Haematocrit (%)	31·9	43·3	45·5
M.C.V. (cμ)	119·0	94·3	86·5
M.C.H. (γγ)	39·2	31·1	29·1
Serum protein (gm./100 ml.) ...	5·42	6·83	6·89
Serum albumin (gm./100 ml.) ...	2·63	4·11	4·59
Serum calcium (mgm./100 ml.)	8·5	10·8	11·4

In general it could be said that oedema developed when the serum-protein level was below 5 gm./100 ml., but the development of oedema was more closely correlated with serum-albumin level than with total serum-protein.

In spite of the low level of serum calcium, there were no unequivocal signs of calcium deficiency.

Investigations relating to plasma volume and blood volume changes are to be the subject of a further report. *Dean A. Smith.*

WALTERS, J. H., ROSSITER, R. J. & LEHMANN, H. **Blood-Volume Changes in Protein Deficiency.** *Lancet.* 1947, Feb. 15, 244–9, 4 figs. [15 refs.]

In a previous report [see above] the authors described their clinical and certain laboratory findings in 2,000 Indian ex-prisoners of war. They selected a small group for a special study of plasma and total circulating volumes, which is the subject of the present paper.

The following measurements and determinations were carried out: serum protein concentration, plasma volume, blood volume, haemoglobin concentration, total circulating haemoglobin, total circulating red cells, total circulating plasma protein. All were found low on admission, plasma volume least so, when compared with the findings upon discharge and in a control group. The reduction in the plasma protein was entirely in the albumin fraction [and not, as is stated in the summary, in the globulin fraction]. In addition to absolute determinations, all findings were calculated per unit body-weight, body-height and surface area. All measurements involving body-weight were rendered difficult of precise interpretation by the presence, in the early stages, of massive oedema.

The changes and rates of change during recovery were followed. The plasma volume rose very quickly (0–4 weeks) to a level considerably above normal and only returned to normal at 8–16 weeks. The blood-volume and total circulating plasma protein returned to normal rather more slowly (2–12 weeks), and it was only much later (8–16 weeks) that such factors as body-weight, total circulating haemoglobin, haemoglobin and plasma protein concentrations and albumin/globulin ratio returned to normal.

On the basis of these findings, it was possible to calculate the rate of production of haemoglobin, plasma protein and red cells during recovery from starvation of this type, mean values being 7·9 gm. of circulating haemoglobin, $27{\cdot}2 \times 10^{10}$ red cells and 2·3 gm. of circulating plasma protein per day.

[This contribution adds considerably to our quantitative knowledge of the changes in blood- and plasma-volume which occur in protein deficiency and the recovery from starvation. Experience in prison camps and of experimental starvation has suggested that nutritional oedema, which was the outstanding *clinical* feature in many of these cases, cannot be fully explained on the basis of changes in the circulating blood or its constituents, particularly plasma-albumin, alone. Further research is needed, on the lines followed by Lieut.-Col. Walters and his associates, but extended to determine the changes which occur in the extravascular fluid compartments of the body and, possibly, in the permeability of capillary and cell membranes.] *Dean A. Smith.*

FEHILY, Lydia. **Deficiency Diseases in Reoccupied Hong Kong.** *Brit. Med. J.* 1947, Feb. 8, 220–22.

This paper is an interesting sequel to the author's description of nutritional diseases in Hong Kong before the war in the Pacific (*Brit. Med. J.*, 1945, Oct. 6, 468). It records that in reoccupied Hong Kong, though the general level of nutrition was low, there was a surprising absence of evidence of specific vitamin deficiency. This is attributed to the fact that the rice consumed, though highly milled, had never been stored long enough to undergo degeneration.

Surveys six months and one year after reoccupation revealed a considerable improvement in general health with great lowering of mortality rates, though there was still evidence of mild Vitamin B-complex deficiency, especially the ocular manifestations of ariboflavinosis, among children in institutions. The high prices of fruit and vegetables led to small isolated outbreaks of scurvy.
Dean A. Smith.

THOMSON, A. M. & FREEDMAN, B. **An Epidemic of Riboflavin Deficiency in Indian Troops.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 399–409.

Outbreaks of deficiency disease attributable to uncomplicated lack of a single factor are rare. The present paper describes an epidemic among Indian

troops of what appeared to be pure ariboflavinosis. About 20 per cent. of the men were affected and 100 cases were selected for detailed study.

Lesions of the tongue, lips and buccal and pharyngeal mucosa were of the type frequently described in ariboflavinosis, but seborrhoeic lesions of the nasolabial regions and scrotal dermatitis were not observed; excessive lachrymation, present in only a few cases, was the only ocular manifestation. Mental and physical lethargy were marked, but responded very rapidly to adequate treatment.

Controlled therapeutic tests were carried out on comparable groups of patients. Synthetic riboflavin cured the condition uniformly and rapidly; yeast less rapidly; and liver extract, nicotinic acid and halibut liver oil not at all. Untreated control cases were unimproved or worse at the end of the test period.

After the institution of a new dietary scale, the condition almost completely disappeared. The calculated riboflavin content of the former ration was 1·1 mgm., of the latter 1·4 mgm. daily. *Dean A. Smith.*

KEKWICK, A., WRIGHT, R. J. & RAPER, A. B. **Ascorbic-Acid Metabolism of Bantu Soldiers.** *Lancet.* 1947, Mar. 29, 397–401, 3 figs. [20 refs.]

An abstract of this paper appears in *Bulletin of Hygiene*, 1947, v. 22, 466.

NARDINI, J. E. **Vitamin-Deficiency Diseases in Allied Prisoners of the Japanese.** *U.S. Nav. Med. Bull.* 1947, Mar.–Apr., v. 47, No. 2, 272–8.

HAEMATOLOGY.

GOLDSMITH, Grace A. **Hematologic Effects of Pteroylglutamic Acid (Folic Acid) in Man.** *Proc. Soc. Exper. Biol. & Med.* 1947, Jan., v. 64, No. 1, 115–18, 1 fig.

Pteroylglutamic acid, commonly known as folic acid or the *L. casei* factor, has been available in synthetic form since 1945. The author has now treated 23 patients with macrocytic anaemia, and has observed 7 of these patients for more than 6 months. Improvement was seen in 17 of the 23; all patients with pernicious anaemia showed marked increase in the red cell count, in haemoglobin and in packed cell volume. In 5 patients with sprue, the blood picture was affected in three only, but all improved in other respects—there was relief of glossitis and diarrhoea, gain in weight and better absorption of nutriment.

The haematological effects of pteroylglutamic acid are similar to those of liver extract, except that the red cell count does not seem to rise so high as with liver; reticulocyte response was better when the acid was given by mouth than when administered parenterally. A dose of 5 mgm. daily appeared to be as effective as higher doses. *Charles Wilcocks.*

DERMATOLOGY AND FUNGUS DISEASES.

Ukrainian Central Institute of Dermatology and Venereology. [**Problems of Dermatomycology.**] [Krichevski, A. M. (Edited by)]. 468 pp. [In Russian pp. 1–423. French summaries pp. 425–57.] 1941. Kharkov.

This volume contains a large number of papers, mostly short, in Russian with French résumés, dealing with fungous diseases of the skin, written for the most part in 1939. *H. J. O'D. Burke-Gaffney.*

Berlin, C. **Degeneratio Colloidalis Cutis Solaris ; Purpura Solaris. Etiologic and Clinical Considerations.** *Brit. J. Dermat. & Syph.* 1946, Nov.–Dec., v. 58, Nos. 11/12, 274–9. [20 refs.]

Smith, C. E., Beard, R. R., Whiting, E. G. & Rosenberger, H. G. **Varieties of Coccidioidal Infection in relation to the Epidemiology and Control of the Diseases.** *Amer. J. Pub. Health.* 1946, Dec., v. 36, No. 12, 1394–402. [18 refs.]

The United States Army air fields in the endemic areas of coccidioidomycosis in California, afforded a means of making observations on recent infections amongst the " permanent " staff, who remained for a sufficient time on the station to enable a series of coccidioidin skin tests and clinical observations to be carried out. Part of this work is dealt with in another report by the same authors [this *Bulletin*, 1947, v. 44, 537]. By relating the results of the coccidioidin skin sensitivity test to clinical symptoms and personal health records, it was found that a large proportion (approximately 60 per cent.) of the infections were clinically symptomless. New reactors, found by re-testing, amongst persons previously negative to the coccidioidin test, were classified as " inapparent infections " if neither clinical signs nor a history of illness was obtained ; " atypical " or " subclinical " if there was only a history of an influenza-like illness in the absence of epidemic influenza, or pleural pain suggestive of coccidioidomycosis for which the patient did not report for medical examination ; and " clinically diagnosed " when a correct diagnosis on clinical evidence was possible. Amongst 1,351 reactors, 24·6 per cent. were clinically diagnosed, 15·8 per cent. were classified as missed or subclinical and 59·6 per cent. as inapparent infection.

The diagnostic value of allergic erythema nodosum, which was regarded as an outstanding feature of " Valley fever " (one form of primary coccidioidomycosis), is diminished by its absence in about 95 per cent. of the total coccidioidal infections in white males, or in 80 per cent. of clinically diagnosed cases. It is more frequent in infections in white females but is very rare in the negro. It may be used as an index of the total infections if the correct factor can be assessed : in the present series this was 5 per cent. in the case of white males.

Some early reports on the newly discovered primary stage of coccidioidomycosis put the proportion of cases in which the disease became disseminated in the body and progressed to the grave coccidioidal granuloma stage, as low as 1 in 700. Observations on the present series, however, show that approximately 1 in 100 of the clinical cases, or 1 in 400 of the total infections, in white males became disseminated, and in the case of white females, assuming that the infection rate is equal in the two sexes, the dissemination rate would be only one-fifth of that in the male. The relation of race or nationality to the dissemination tendency is very marked, and it was estimated that the Mexican was 3½ times, the negro 14 times and the Filipino 180 times more susceptible to this unfavourable development than the white race. Regarding the time of

occurrence of dissemination, this was within three and a half months of the onset of the disease in all the twelve cases in the present series, and in six of these it occurred within the first three weeks. Dissemination, therefore, seems to occur during the initial illness, without a latent period, and the authors consider " that dissemination years later must be very unusual ".

J. T. Duncan.

DUARTE, E. Histoplasmose. [**Histoplasmosis.**] *Mem. Inst. Oswaldo Cruz.* 1945, v. 43, No. 3, 457–94, 7 figs. [50 refs.] English summary.

A critical historical review.

HEAT STROKE AND ALLIED CONDITIONS.

HENRY, P. S. H. & REES, W. H. **The Transfer of Heat through Sun Helmets.** *Brit. J. Indust. Med.* 1946, Oct., v. 3, No. 4, 225–36, 4 figs.

During the early years of the war of 1939–45, work was carried out by the British Cotton Industry Research Association on the heat protection afforded by military sun helmets. This paper describes the results of the experiments. It includes a discussion of the modes of heat transfer through helmets, with an analysis of the heat flow. The effects of changes in helmet structure on heat exchanges are examined, and the importance of metallic lining is shown.

The helmet under test was placed on a plaster of Paris " head ", and subjected to radiation from an electric radiator placed vertically above it. The rise in temperature of the surface of the head after two hours was taken as a measure of the flow of heat to the head, and the temperatures of the various parts of the helmet were also measured. The Army helmet consisted of a wool felt body stiffened with shellac, covered on the outside with khaki drill, and lined with aluminium foil or aluminized fabric. It was supported away from the head by small spacers which connected it to the head-band whilst allowing a gap between the head-band and the helmet. Sometimes a dome-shaped " drop lining " of aluminium foil or aluminized fabric was attached to the head-band. Experiments were carried out with the helmet unventilated, *i.e.* with the opening at the top and the gap between the head-band and the helmet closed, and with it ventilated.

With a rexine lining and no drop-lining, the rise in the temperature of the head was 25·5°C. when the lining was unventilated, and about 21°C. when it was ventilated. The helmet lined with aluminium but with no drop-lining gave corresponding figures of 14°C. and 12°C. The best results were given by a helmet lined with aluminium and provided also with a drop-lining with aluminium on both surfaces. The experiments on these helmets showed increases in the head temperature of 9·3°C. when the helmet was ventilated, and 9·7° when it was not.

The possibility of improving sun helmets is discussed. If it were practicable to use a metallic or white outer covering, there would be a considerable diminution in the amount of solar radiation absorbed. Conduction through the helmet could be reduced by increasing the thickness of the helmet whilst keeping its conductivity low, as in the pith helmet. It has been noted that the aluminium-lined helmet with a double-sided aluminium drop-lining gave the best results. With such a helmet there is a lack of ventilation of the head. It is suggested that improvement of ventilation is the direction in which improvement of sun helmets can best be brought about. The ventilator at the top provides an inadequate opening, and trials showed that by increasing the size of the apertures

the rise of temperature within the helmet was substantially decreased. The Appendix to the paper gives the emissivities of various lining materials. It is noteworthy that while bright aluminium foil has an emissivity of only 4 per cent. at 100°C., its emissivity increases to 26 per cent. when it is lightly smeared with oil. The aluminium linings of helmets should be kept clean.

T. Bedford.

YAGLOU, C. P. & RAO, M. N. **Loose versus Close-Fitting Clothing for Work in "Tropical Heat".** *J. Indust. Hyg. & Toxicol.* 1947, Mar., v. 29, No. 2, 140–42.

For work in warm and humid atmospheres, one-piece, loose-fitting garments with openings at the ankles, waist, neck and wrists are generally recommended, but some believe that an absorbent and close-fitting garment which clings to the skin may help to facilitate the loss of heat from the body. Tests were carried out during the war on behalf of the National Research Council of America; the experiments were done in a room with air and walls at 85°F., and with a relative humidity of 85 per cent. The speed of air movement relative to the subjects was about 70 ft. per minute. The three subjects—healthy men—performed step-climbing at a rate which called for an energy expenditure of 255 calories per hour. Work was done for 25 minutes in each half-hour for a period of at least 4 hours.

The close-fitting garments used were 80/20 cotton-wool knitted union suits, chosen to fit each man individually, and of an average weight of 480 gm. The loose-fitting garments were two-piece cotton pyjamas weighing 320 gm. The tests on these garments were carried out during winter, and during the following summer, further tests were made on the "Quartermaster-General" poplin jungle suit. This latter garment was tested with the trouser legs and the collar open (ventilated) as well as closed (unventilated). Further tests were made with the subjects unclothed.

All the men felt cooler and less tired during and after work in the experiments done without clothing. They disliked working in the close-fitting union suit and in the unventilated jungle suit, because they became damp and sticky as well as too warm. Adherence of wet clothing to the skin was objectionable. The loose-fitting pyjama suit was the coolest garb. The ventilated jungle suit also remained mostly dry. Similar results were shown by the objective measurements, especially the rate of sweat production.

It is concluded that in tropical heat the rate of sweat secretion during work is a better index of the heat discomfort than is the pulse rate or the rectal, skin or mouth temperature. When solar radiation is no problem, any clothing is a hindrance to body heat loss, and if clothing must be worn it should be loose-fitting and of light weight. It should be designed for maximum ventilation and should expose as much skin area as possible. Clothing should be designed to give ventilation by bellows action. The closing of the jungle suit to keep out mosquitoes imposes considerable heat strain on the wearer. *T. Bedford.*

WYNNE, R. L. **A Simple Formula for the Calculation of Atmospheric Dryness.** *Brit. Med. J.* 1947, Apr. 19, 528–9, 1 chart.

In British practice, not enough attention is paid to atmospheric conditions in operating theatres. They are allowed to become too hot, and their humidity is raised by steam from sterilizers. Conditions should be controlled in these places, where the mental alertness of the staff must be preserved, and where the heat-regulating functions of the patient are upset by anaesthesia. An instance is given of the death from heat stroke of a patient operated upon in an underground hospital during the war.

It is recommended that wet- and dry-bulb thermometers should be more commonly used in operating theatres. For really accurate results a ventilated hygrometer, either of the whirling or the Assmann type, should be used, but the author seems to think that sufficiently good results can be obtained by using wet- and dry-bulb thermometers simply suspended in the air. He gives a simple formula for calculating an "index of drying power"—a measure of the saturation deficit, and suggests that a wet-bulb temperature of 70°F. should be regarded as the upper limit of safety in an operating theatre. *T. Bedford.*

TROPICAL ULCER.

GOLDEN, A. **A Comparison of the Pathologic Anatomy of the Central American Tropical Ulcers and those of a Variety of Leg Ulcers of North America.** *Southern Med. J.* 1947, Mar., v. 40, No. 3, 214–17, 2 figs.

"(1) Evidence has been presented that highly characteristic vascular lesions are specific in the tropical ulcers of Guatemala.

"(2) A comparison of biopsies of a variety of North American leg ulcers and those of the tropical areas of Guatemala reveal no comparable vascular lesions in the two." [See this *Bulletin*, 1946, v. 43, 1185.]

MISCELLANEOUS DISEASES.

HEISCH, R. B. **Two Years Medical Work in the Northern Frontier District, Kenya Colony.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 3–15, 1 fig. & 1 map.

Very little is known about the diseases of the Northern Frontier District of Kenya, a large country with poor rainfall, covered with thorn bush, and sparsely populated by nomads who live mainly on meat and milk.

The author spent two years in the Province, and used them profitably. Malaria was common, endemic with seasonal epidemics, *Plasmodium falciparum* and *P. malariae* predominating in different places; the carrier is *Anopheles gambiae*, which shows marked seasonal variations in its numbers, dependent on the rainfall.

Kala azar had been suspected in the Province; the author verified its presence and identified an endemic focus at Sericho. Catches of sandflies included *Phlebotomus langeroni* var. *orientalis*; *P.* sp. nova *Rostala* A. (*sic.*); *P. cleidei* (a Sudan vector); *P. simpleuris*, and a new species to be described.

Undulant fever occurred and may have been due to either *Brucella abortus* or *Br. melitensis*. Relapsing fever was not uncommon, and was perhaps transmitted by *Ornithodorus savignyi*. Typhoid occurred, dysentery was frequent and chiefly in the bacillary form. Trachoma was widespread, pneumonia and tuberculosis common. Other reported diseases included syphilis, gonorrhoea, chicken pox, measles, schistosomiasis, madura foot, and scabies. Tropical ulcer is said to be relatively rare among the Somalis, a fact attributed to the diet with its high meat and milk content. [As a contribution to medical cartography this paper is of more value than can be shown in a summary. It contains much useful material worth consulting by those interested in the region.] *G. Macdonald.*

SHAFFER, L. J. O. **Ainhum. Report of a Case in which the Patient was a White Woman with Diabetes Mellitus.** *Arch. Pathology.* 1947, Feb., v. 43, No. 2, 170–76, 3 figs. [31 refs.]

JENNISON, D. B., HELWIG, E. B. & MILSTONE, J. H. **Granuloma Inguinale involving Buttock and Lymph Node. Cultivation of the Donovan Body in Embryonic Yolk.** *Arch. Dermat. & Syph.* 1947, Mar., v. 55, No. 3, 342–54, 8 figs. [13 refs.]

GENERAL PROTOZOOLOGY.

TRUSSELL, R. E. **Microagglutination Tests with** *Trichomonas vaginalis*. *J. Parasitology.* 1946, Dec., v. 32, No. 6, 563–9, 3 figs. on 1 pl.

Strains of *Trichomonas vaginalis* were grown free from bacteria in a special medium. Doses of washed flagellates, either living or killed by the addition of 1 : 2,000 formalin or 1 : 20,000 phenyl mercuric borate, were injected intravenously to rabbits over a period of 13 weeks. Subcutaneous injections of killed flagellates were also made. Blood was withdrawn from the heart of the rabbits from time to time and the separated serum used for microagglutination tests. It was found that the intravenous inoculations caused the development of increasing amounts of agglutinin which in one case was effective in a serum dilution of 1 : 10,240. Three strains of the flagellate showed a close antigenic relationship as regards agglutination titres of the serum of immunized rabbits. Agglutination absorption tests revealed the same relationship. Similar tests were carried out with sera from 100 pregnant and 100 syphilitic patients, who are known to be particularly liable to *T. vaginalis* infections. Of those in the first group, 10 gave positive sera as against 9 in the second group. The author believes that the fact that the flagellate stimulates antibody production and can be studied by known serological procedures has therapeutic and taxonomic implications. *C. M. Wenyon.*

GENERAL ENTOMOLOGY.

HARVEY, A. E. C. **The Care and Maintenance of Laboratory Animals and Arthropod Vectors of Disease.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 58–71.

The methods and elementary precautions described so briefly in this paper are well known to workers who have had to learn by experience; it is well therefore that such knowledge should be gathered into one paper and made available to those who have to look after laboratory animals and insect cultures.

After a few general remarks on the housing and care of animals, the author passes on to some more detailed notes on the breeding and feeding of particular animals such as mice, rats, guineapigs, rabbits, monkeys, birds and lizards. He deals with such matters as the proportion of males to females; sizes and kinds of boxes and cages; diet; ages for weaning and for experiment; types of bedding; marking and labelling; disinfestation; handling and immobilization.

The second part of the paper is concerned with laboratory rearing procedure for ticks (*Ornithodorus*) (a warning is given here about the possibility of wild-caught ticks being infected with spirochaetes); bugs (*Cimex*); lice (*Pediculus*);

fleas ; flies (*Musca*) ; sandflies (*Phlebotomus*) ; mosquitoes (*Aëdes aegypti*) ; attempts have been made to maintain a colony of *Anopheles gambiae* but they have so far failed ; however, methods found successful by other workers are described.

The author rightly points out the danger of allowing insecticides to come, or be brought, anywhere near insect cultures and insectaries, either on contaminated equipment, on clothing or on the person. *H. S. Leeson.*

ANDUZE, P. J., PIFANO C., F. & VOGELSANG, E. G. Nomina de los artropodos vulnerantes conocidos actualmente en Venezuela. [**The Harmful Arthropods known in Venezuela.**] *Bol. Entom. Venezolana.* 1947, Jan. 24, v. 6, 1–16.

HARPER, J. O. **A Mosquito Survey of Mahé, Seychelles.** *East African Med. J.* 1947, Jan., v. 24, No. 1, 25–9.

VAN SOMEREN, E. C. C. **Appendix. The Description of a New Mosquito from the Seychelles.** *Ibid.* 29–35, 4 figs.

Mahé is one of the largest of the Seychelles Islands ; it is mountainous and forested and the climate is humid. Victoria, the capital, is on Mahé and has a population of 5,000, living on the sea-front usually in small, raised wooden shacks thatched with palm leaves and surrounded by bread fruit trees, coconut palms and other vegetation.

Eight species of culicine mosquitoes were recorded, but no anophelines were found ; potential breeding places for the latter are numerous and the danger of the re-introduction of *Anopheles gambiae* is very real. Concern is also felt about the possible introduction of yellow fever from Africa.

Mosquito larvae were very rare in tree-holes but two species were taken, *Aëdes albopictus* and a new species of *Culex*. The male, female, pupa and larva of the latter are described in the Appendix under the new name *Culex* (*Neoculex*) *stellatus*. Axils of plants contained *Uranotaenia nepenthes*, *U. pandani* and *Aëdes albopictus*. Receptacles in the cemetery provided *A. albopictus* and *A. aegypti* ; breeding of these two species and of *Culex fatigans* was found on domestic premises, but not in shipping in the port area. In other places and islands near Victoria, larvae of *A. albopictus*, *Culex fatigans* and *C. simpsoni* were found.

Adults of *Aëdes aegypti* were found with difficulty in one house out of sixty searched, but more easily in hotels and offices. Out of doors adults of *A. albopictus* and *A. pembaensis* were taken. *H. S. Leeson.*

TSHINAEV, P. P. [**Key to the Identification of the Pupae of the Tribe Culicini.**] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 74. [In Russian.]

This is a dichotomous key for the identification of the pupae of the tribe Culicini found in Uzbekistan and comprising species of the genera *Uranotaenia*, *Culex*, *Theobaldia* and *Aëdes*. *C. A. Hoare.*

KHELEVIN, N. V. [**On the Biology of** *Aëdes.*] *Med. Parasit. & Parasitic Dis.* Moscow. 1946, v. 15, No. 3, 63–8. [In Russian.]

The author describes the results of laboratory and field experiments on the hatching of the eggs of *Aëdes caspius dorsalis*. It was found that the hatching of larvae was not synchronized and this peculiarity is regarded as an adaptation to breeding in temporary collections of water. The lack of synchronization protects the mosquitoes against complete destruction of the offspring when the breeding place dries up prematurely. Furthermore, eggs laid at the same

time do not all hatch during the same season, even under the most favourable conditions. The majority of eggs laid in summer have no diapause, while the majority laid in August are already in diapause ; on the other hand, eggs laid in September are hatched exclusively after the diapause. *C. A. Hoare.*

Floch, H. & Abonnenc, E. Distribution des Phlébotomes en Guyane Française. [**Distribution of *Phlebotomus* in French Guiana.**] *Institut Pasteur de la Guyane et du Territoire de l'Inini. Publication No. 142.* 1946, Dec., 7 pp., 1 map.

Potts, S. F. **Particle Size of Insecticides and its relation to Application, Distribution, and Deposit.** *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 716–20.

Ginsburg, J. M. **Comparative Toxicity of DDT Isomers and related Compounds to Mosquito Larvae and Fish.** *Science.* 1947, Feb. 28, 233–4.

Pendse, G. S., Gokhale, V. G., Phalnikar, N. L. & Bhide, B. V. **Investigation of New Plant Larvicides with special reference to Spilanthes Acmella.** *J. Univ. Bombay.* 1946, Nov., v. 15, Pt. 3, 26–30.

Acharya, C. N. & Rao, K. S. K. **Experiments on the Control of Fly-breeding in Compost Trenches.** *Indian J. Agric. Sci.* 1945, Dec., v. 15, Pt. 6, 318–27, 2 figs. [25 refs.]

The authors classify existing methods of fly control under the headings mechanical and chemical, biological, thermal and electrical, but none of them was suited to Indian conditions : they were either ineffective or expensive.

Laboratory experiments and field trials were therefore undertaken to discover simpler and cheaper ways of dealing with fly breeding in compost masses. In this paper the authors are concerned only with the house fly (*Musca domestica*) but the work is being extended to include other flies which haunt compost depots. Experiments with different coverings placed on top of the compost mass showed that lowest emergency rates for flies resulted from those masses covered with an earth-dung plaster (1·6 percentage emergence) and with tarred cloth (1·2 percentage emergence) and that two to three days was sufficient to kill larvae and pupae.

These two methods were therefore tested against others in the field in pits, trenches and on heaps. In pits and trenches, they gave similar good results though it was found that to obtain a 95 per cent. kill of larvae the covers had to remain in place for a week from the sixth to the thirteenth day after filling up the pit. On overground heaps, the results were equally good but more care had to be taken, especially in sealing up the edges, and the cost was about double.

Burning a layer of dry refuse on top of an earth cover was also tried. These tests showed that when fire treatment was given on the sixth day, there was a fly emergence of about 10 per cent. ; a second fire treatment on the tenth day brought the figure down to 4·6 per cent. Fire treatment was not so effective on heaps as in trenches.

Of the three methods, the authors conclude that the tarred cloth treatment will be found best suited for most compost centres and is the cheapest to operate.

H. S. Leeson.

Linduska, J. P., Cochran, J. H. & Morton, F. A. **Flea Repellents for Use on Clothing.** *J. Econom. Entom.* 1946, Dec., v. 39, No. 6, 767–9.

Tests for repellency to the fleas *Ctenocephalides canis* and *C. felis* were made by impregnating cloth strips and exposing them briefly to heavy flea populations.

Other tests were made by exposing treated stockings while being worn, the wearer standing in a tub containing several thousand fleas. At least twenty-six materials were found to be strongly repellent and gave over 90 per cent. reduction of the numbers clinging to the cloth strips or climbing up the stockings. Benzyl benzoate and 2-phenyl cyclohexanol were found to be considerably more effective as clothing repellents than the well known dimethyl phthalate or Indalone or " Rutgers 612 ". " Lethane 384 Special " and " Thanite " gave very poor results.

The substances *p*-iso-prophylphenyl ethyl alcohol and 1,2,3,4-tetrahydro-2-naphthol gave complete protection, but their possible toxic or irritant properties have not yet been investigated. *J. R. Busvine.*

BEQUAERT, J. C. **The Ticks, or Ixodoidea, of the Northeastern United States and Eastern Canada.** Reprinted from *Entomologica Americana.* 1945, v. 25 (n.s.), No. 2, 73–120 ; No. 3, 121–84 ; No. 4, 185–232. [Issued on May 17, 24 & June 27, 1946, respectively.]

The author provides an interesting full review of the ticks of the N.E. United States and Eastern Canada. The paper is of general value, as an up-to-date summary in addition to its local importance (to which this summary gives slight attention).

The general section of the paper opens with an account of the effects of the bite, such as the tissue reactions, the resulting allergy and the passage of ticks (through an oedematous and necrotic area of skin at the point of attachment) into the host's subcutaneous tissues. Tick paralysis is briefly discussed : it has been observed only once in this area [a remarkable absence, in our view].

In Eastern America, man is only an accidental host of ticks, and is never the source of infection in another man : the tick carries the infection from a wild animal to one particular human being. Having made this preliminary point, the author passes to a full and interesting account, written by a naturalist, of the relation of ticks to Rocky Mountain Spotted Fever and tularaemia.

Rocky Mountain Spotted Fever is, as is now generally recognized, a common and serious disease of man in Eastern United States, there being records from eleven States, though none from Canada. Very little is known of the presence of the infecting agent in ticks or wild animals in the East.

The author then discusses the origin of human cases of tularaemia. As the condition is always " accidental " one must take the problem further back. In the author's view, though many channels of infection exist, normal transmission among wild animals and birds is by ticks. He summarizes the evidence relating to the " rabbit-tick ", *Haemaphysalis leporis-palustris*, which transmits tularaemia among rabbits and hares : infection is known to be hereditary in this tick, and the infection normally passes the winter in hibernating ticks : as larvae and nymphs may attach themselves to migrant birds it is perhaps disseminated in this way. This tick and one or two others that are mentioned do not bite man. He owes his liability to infection, partly at least, to the fact that species of *Dermacentor* attach themselves to him. In Eastern America the important species is *D. variabilis*. This tick is apparently not so good a host as *D. venustus* of Western America : in *D. variabilis* hereditary infection appears to be unusual, if it occurs at all, and the micro-organism tends to die in the tick during the digestive processes which follow a subsequent blood meal. Other insects which may transmit *P. tularensis* are listed. The author is disinclined to regard the Tabinid, *Chrysops discalis*, as important ; these flies do not feed on rabbits, and though they often bite man there is no evidence that they transmit tularaemia, at least in N.E. America.

The author gives an interesting discussion on the effect of ticks, and infections transmitted by them, upon wild mammals and birds. For instance he considers tularaemia in the community of rabbits and hares. In some of these species the infection tends to be chronic, so that perhaps these may be carriers ; there are, however, large parts of America in which these hares do not occur. In other species, *e.g.* the cotton-tail, the disease is rapidly fatal, and this infection is one of the causes of the great natural epizootics in these creatures. There are many complications in these stories : some sorts of tick choose different species of host as larvae and adults.

From natural history the author passes to control [and here he writes rather as a biologist than as one of those practical men].

Local records of human cases of Rocky Mountain spotted fever and tularaemia are given in detail, by States and Provinces. The great increase in recent years is attributed to better diagnosis.

The latter two-thirds of the book are of local value. The ticks known from each State and Province are listed, and those of each known host, bird or mammal : we observe that no reptile hosts are recorded. The systematic section includes keys to genera and species, separate keys for larvae and nymphs being given when possible. This is a welcome feature : in view of the differences in biology and feeding habits between some adult ticks and their early stages, the identification of the latter is important. The systematic section includes detailed distribution, habits, and hosts. There are no illustrations.

P. A. Buxton.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

PLATT, B. S. **Colonial Nutrition and its Problems.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1947, Mar., v. 40, No. 4, 379–89. [16 refs.] Discussion 390–98 [YOUNG, W. A. ; DAVEY, J. B. ; MANIFOLD, J. A. ; CHESTERMAN, C. C. ; WENYON, C. M. ; MANIFOLD ; WILLS, Lucy ; WALTERS, J. H. ; STANNUS, H. S. ; PLATT, B. S. (in reply).]

Professor Platt, in this paper, discusses the complex and enormously important problems of colonial nutrition mainly in two aspects. Firstly he deals with the collection of information regarding nutritional health of colonial peoples, the prevalence of signs of deficiency and their relation to the nutrient value of the dietaries, and other evidence from vital statistics, hospital returns and other relevant sources. Examples are taken from information which has become available in the decade 1937–1946. Secondly, he describes the lines on which work is being done to achieve improvement.

The data on which an assessment of the nutritional status must be based are :—

(1) Reports from medical departments of institutional cases of, and deaths due to, nutritional deficiency diseases (such as beriberi, pellagra etc.) and diseases partly attributable to malnutrition (such as anaemias, tropical ulcer, infantile diarrhoea, toxaemia of pregnancy and pulmonary tuberculosis).

(2) Infant and maternal mortality rates.

(3) Infant birth weights.

(4) Evidence of malnutrition from clinical researches.

(5) Surveys of nutritional state in general populations, preferably combined with a study of food consumption, supplies and economy.

The following are a few of the minor signs of nutritional ill-health which may be recorded on a simple clinical examination :—

Hair, dry, staring	Skin, atrophic
hypochromotrichia	defective hairs
Eyes, photophobia	xerosis
excess tissue	crackled
Lips, cheilosis	loss of elasticity
Tongue, colour changes	" permanent gooseflesh "
papillae lost	folliculosis
fissures	ulcers and scars.
Gums, bleeding	Nails, defective or rough
Teeth, caries	Muscles, poor development

[In the discussion it was agreed that haemoglobin levels are of value as an index of the state of nutrition.]

As an example of the correlation between clinical evidence of nutritional ill-health and nutrient contents of dietaries, summarized results of three surveys, in Barbados, the Gambia and Nyasaland, are given.

With regard to measures for the improvement of the nutritional level in colonial territories, Professor Platt refers to his recent publication *Nutrition in the British West Indies* (1946, Colonial No. 195, London : H.M. Stationery Office) [*Bulletin of Hygiene*, 1946, v. 21, 601] and to his paper on "The Colonial Nutrition Problem" in the *Proc. Nutritional Soc.*, 1946, v. 5, 2–15, and concludes, "The improvement of nutrition is certain to be a complex procedure ; it involves the co-operation of various departments and agencies ; it needs to be carefully planned and will be effective only by the combined efforts of the producer, consumer, technical and administrative personnel, as well as the medical man. It is to be hoped that " combined operations " will be undertaken throughout the Colonial Empire, applying suitable incentives, modern methods of food production and technology, improved hygiene and medical care and education." *Dean A. Smith.*

PETERKIN, G. A. G. **Sequelae of Tropical Disease—Skin Conditions.** *Edinburgh Med. J.* 1947, Jan., v. 54, No. 1, 36–9, 1 fig.

CAMERON, J. D. S. **Sequelae of Tropical Disease.** *Ibid.* 40–47.

A discussion of manifestations of tropical disease which may be encountered in persons returned from the tropics.

PESIGAN, T. P., REYES, F. A., Jr. & YOGORE, M. G., Jr. **Some Newer Knowledge in Parasitology : a Review.** *J. Philippine Med. Ass.* 1946, Sept., v. 22 No. 9, 389–404. [28 refs.]

BOOK REVIEWS.

VAN NITSEN, R. [Ancien Médecin en Chef de l'Union Minière du Haut-Katanga.] **Le pian.** [Yaws.] *Institut Royal Colonial Belge. Section des Sciences Naturelles et Médicales. Mémoires.* (Collection in–8°.) 1944, v. 13, No. 1, 128 pp., 12 figs. on 6 pls. [103 refs.] [45 fr.]

This memoir could better be titled *Le pian au Congo belge*, for most of the 103 references listed at the end are based upon observations in that area. Reference is also made to non-Congo papers which are not included in the above list. There are many verbatim extracts, but the memoir is a useful and readable summary.

For the most part, yaws as seen in the Belgian Congo resembles yaws as reported from other countries. The following notes stress points of special

interest. Meteorological factors do not seem to influence the incidence of yaws; probably absence of clothes, poor sanitary conditions, and mixing of healthy and infected individuals, especially in their huts at night, are more important. The three stages of yaws overlap and secondary and tertiary lesions may be present together. The primary yaws lesion is usually extragenital; it is not indurated and is more often absent than is the chancre in syphilis. The polymorphism of the secondary lesions is stressed. In the latent period which often follows the secondary stage, various pains and palmar and plantar lesions occur. These lesions may be either typical yaws erupting through thick skin or hyperkeratotic fissured lesions. [No mention is made of bone lesions in the secondary stage.]

In the tertiary stage, in addition to the usually described lesions, are included sabre-tibiae, goundou and polydactylitis. [Goundou and non-destructive polydactylitis are often associated with typical secondary skin lesions.] Dactylitis sometimes ends in absorption of phalanges so that the affected digit is telescoped.

To achieve *la cure de blanchiment* or the disappearance of active lesions, one or two injections of a suitable arsenical or bismuth preparation may suffice. The workers of the Fond Reine Elisabeth Assistance Médical aux Indigènes recommend 5 weekly injections of neoarsphenamine and four of bismuth but it is suggested that 6 injections of each would be better. In tertiary lesions, 7 injections of neoarsphenamine and 12 of bismuth with one month's rest between the 6th and 7th bismuth injection are recommended. On pages 70 and 79–81 are interesting data relating to the dosage sometimes required to produce negative serum Wassermann reactions. In some cases very little more treatment was required to produce a negative reaction than to produce clinical cure; however, more study is required after treatment in following up cases with periodic serological tests.

On the vexed question of yaws and syphilis, the author is a confirmed dualist and quotes two tables of differences.

Practical measures to combat yaws consist of efforts to educate the population and to reduce direct contact with infectious cases: more importantly, they include therapy to achieve *blanchiment*; this is provided by clinics, static or mobile. For this purpose, neoarsphenamine and bismuth salts are chosen; but full courses such as those indicated above may not always be possible. Treatment must be taken to the patients since it is impracticable to await their attendance at hospitals and other centres. When only a short time is available a second injection might be given three days after the first. At later visits further treatment is given. The incidence of yaws has been halved in 4 years and still further reductions have followed.

In 1938, over a quarter of a million cases of yaws were treated in the Belgian Congo. Yaws was the most frequent disease treated. The primary and secondary stages probably do not seriously inconvenience the population except for plantar lesions, the pain from which may be responsible for muscular and joint changes. Tertiary lesions may profoundly affect the individual and reduce his value in the community. However, where yaws is of high incidence it is responsible for more misery and suffering than all the other diseases together and in the Belgian Congo is one of the great scourges of the African.

That the reduction in the incidence of yaws may be followed by an increase in syphilis is a possibility. "Observations on cross immunity in man are not conclusive, and if certain native races, heavily infected with yaws, appear to remain free from syphilis, this may be due to other causes than immunity. Although treatment might succeed in reducing yaws incidence in a community to such a low level that there is no immunity against yaws and syphilis, this does not mean that this community will inevitably be decimated by syphilis.

In the Congo, at least, syphilis spreads through new races slowly and is only exceptionally epidemic. The danger of syphilis rapidly becoming generalized is practically negligible compared with the consequences of neglected yaws. Yaws in its later stages is a very grave disease both for the individual and the race and should be whole-heartedly combated without taking into account the problematical consequences of its eradication ".

[The memoir is a good account of yaws in the Belgian Congo which will be of local and general value alike, in bringing together many papers on the subject. It contains no chapter on pathology.] *C. J. Hackett.*

MACPHERSON, Kennie. [Formerly Maternity Visitor, York Road Lying-in-Hospital, etc.] **Mothercraft in the Tropics.** pp. xiv+205. 1947. London, Toronto, Melbourne & Sydney : Cassell & Company, Ltd. [6*s*.]

The writer of this book has had many years experience of child welfare work in England and also in Ceylon and in South Africa. The book is divided into two parts. The first, of twenty-three chapters, deals with all aspects of the welfare of mothers, infants and young children in warm climates. The advice given is of a very practical kind and provided in a clear and extremely interesting manner. The regime for the expectant mother, the preparations required for the arrival of the baby, and the routine of life to be followed by children at different ages are set out in considerable detail. Both the physical and—an important point in the tropics—the psychological development of the child are considered. The special requirements of children living in warm climates are explained and the adaptations necessary described.

A particularly useful feature of the book is the detailed description of the diet most suitable for children at different ages in the tropics. In some cases, local Ceylon names of foods are given. It would, perhaps, have been wiser to avoid these purely local names in a book which is meant to have a wider appeal throughout the tropics.

The second part of the book, entitled " Facts a Mother should know," deals with ailments which a mother in the tropics may be called upon to cope with, especially if she living is in an isolated place. Chapters dealing with worms, infectious fevers, tropical fevers, venereal diseases, acidosis, and accidents are included in this part. It is always difficult to give the lay reader a true picture of a disease, whilst, at the same time, retaining scientific accuracy. The author, with her wide experience in teaching mothers, has achieved considerable success in this direction. This section, however, could be made even more valuable in future editions if increased emphasis were laid on up-to-date methods of preventing certain of the more important diseases, especially malaria. Again, for some of the diseases, *e.g.* scabies, more modern methods of treatment might be included. Some diagrams also would be useful ; for example, in illustrating methods of protecting food from insects, and the correct method of protecting a child's bed with a mosquito net.

Doctors are frequently asked to recommend a reliable book on mothercraft suitable for women going to or living in the tropics. This comprehensive little book, full of practical, common-sense advice may safely be recommended by them. It should prove a very valuable guide for a young mother faced with the difficulties which arise in isolated stations. *Mary G. Blacklock.*

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.

(445) Wt. P11/325 9/47 S.E.R. Ltd. Gp. 432.

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